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ABSTRACT

Pima County Adult Education's Workplace Education Project provided workplace education classes at 8 worksites to 322 workers. The worksites included Hughes Aircraft Company; AiResearch Tucson Division; Burr-Brown Corporation; Westward Look Hotel; Tucson Medical Center; Radisson Suite Hotel; Manufacturing & Research, Inc.; and University of Arizona (Facilities Management). All participants were pretested; 249 completers were posttested. Teachers of English for speakers of other languages (ESOL) designed pre- and post-assessments that included speaking, listening, reading, and writing components. Math instructors designed pre- and post-assessments. Reading instructors created a reading assessment using company material. In the writing classes, a student writing sample was taken. (The 12-page report is followed by these appendixes: generic workplace curricula for reading skills, writing skills, math fundamentals, math for statistical process control, algebra, and ESOL; job-specific curriculum matrices; sample company-specific curricula and lessons; sample pre- and post-assessments; sample pre-posttest comparisons: basic math; holistic scoring guidelines for writing sample; sample student needs assessment; sample supervisor needs assessment; sample manager evaluation; sample student course evaluation; and articles about the project. An attached external evaluation report sees the development of assessment instruments as a major contribution.) (YLB)

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PIMA COUNTY WORKPLACE LITERACY PARTNERSHIP

V198A10094

FINAL REPORT

MARCH 1, 1991 - NOVEMBER 30, 1992

REPORT PREPARED BY:

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WORKPLACE EDUCATION PROJECT

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NATIONAL WORKPLACE LITERACY PROGRAM
INFORMATION FORM

Pima County Adult Education
Workplace Education Project
March 1, 1991 - November 30, 1992

Part 1: Program Parameters

1. Target No. to be Served: 230

2. No. Served at Each Site to Date:

Site 1.	71	Site 6.	2
Site 2.	82	Site 7.	16
Site 3.	109	Site 8.	8
Site 4.	9	Site 9.	
Site 5.	25	Site 10.	

3. Total No. Served: 322 +
(47 continuing, not counted more than once)

4. Fed. Funds Obligated: 138,555

5. Matching Funds/ In-Kind: 60,226.45

6. Value Release Time: 20,506.50

7. No. Participating in Programs Offered

Basic Skills	210
*GED	18
**ESL	94

8. Contact Hours Provided: 9077

(Contact Hours are the number of teaching hours that workers receive)

average # of weeks in training cycle =	10
average # of hours of instruction per cycle=	33
average # of hours of instruction per week =	3

Part 2: Participation Data

1. Mean Age Participants: 37

2. Sex: No. Males 110 No. Females 212

3. Race/Ethnicity: No. who are:

White	99	Am. Indian/ Alaska Native	2
Black	17		
Hispanic	107	Asian/Pacific Islander	97

4. No. Single Head of Household: 79

5. No. Limited English Proficient: 119

Outcomes	No. Participants
a. Tested higher on basic skills	185
b. Improved communication skills	94
*** c. Increased productivity	
*** d. Improved attendance at work	
e. Increased self-esteem	279

7. Years with the company	No. Participants
Unemployed	
0-5	178
6-10	81
11-15	45
16-over	18

* 10 workers who participated in the GED class for more than 1 cycle and not counted twice
**37 workers who participated in the ESL class for more than 1 cycle and not counted twice
***Please see Narrative page 5

SITES AND NUMBER OF PARTICIPANTS SERVED

	Sites	Participants Served
Site 1	Hughes Aircraft Company (Missile System Group)	71
Site 2	AiResearch Tucson Division (Aerospace)	82
Site 3	Burr-Brown Corporation (Electronics Manufacturing)	109
Site 4	The Westward Look Hotel	9
Site 5	Tucson Medical Center (TMC)	25
Site 6	The Radisson Suite Hotel	2
Site 7	Manufacturing & Research, Inc. (MRI) (Medical Supply Manufacturing)	16
Site 8	The University of Arizona (Facilities Management Department)	8

WORKPLACE LITERACY PARTICIPANTS BY WORKPLACE AND TYPE OF TRAINING

	Hughes Aircraft Company	AiResearch	Burr-Brown	The Westward Look Hotel	TMC	The Radisson Suite Hotel	MRI	U of A	Total
Communication/ Writing	24	13		9					46
Math Fundamentals	8	30	61						99
Algebra	27	9	17						53
ESOL		30	31		7	2	16	8	94
Reading	12								12
ABE/GED					18				18
Total	71	82	109	9	25	2	16	8	322

37 ESOL students
10 ABE/GED students
47 workers who participated in same class for 2 or more cycles but only counted once

FINAL REPORT NARRATIVE

Pima County Adult Education's (PCAE) Workplace Education Project, funded under the National Workplace Literacy Program, provided workplace education classes at eight worksites to 322 workers. The worksites included: Hughes Aircraft Company, AiResearch Tucson Division, Burr-Brown Corporation, the Westward Look Resort, Tucson Medical Center (TMC), the Radisson Suite Hotel, Manufacturing & Research, Inc. (MRI), and the University of Arizona (Facilities Management).

COMPARISON OF ACCOMPLISHMENTS TO OBJECTIVES

The following information compares actual accomplishments to the objectives contained in the approved application.

Objective 1
A minimum of 230 adults with inadequate basic skills will be recruited and trained in workplace classes.

Accomplishments
Three hundred and twenty-two workers were recruited and trained in on-site workplace classes. Additionally, 47 workers attended more than one ten-week cycle in ESOL or GED Preparation. These workers were only counted once.

Objective 2
A minimum of eight worksite locations, including both large and small Tucson employers, will be served.

Accomplishments
Eight worksites, including large and small employers, were served.

Objective 3
A minimum of 27 class cycles will be completed. A "class cycle" is a class held in a worksite location for an 8-15 week time period.

Accomplishments
Thirty-one class cycles were completed. The average class cycle was 10 weeks (20-40 hours of instruction).

Objective 4
All learners will be pre- and post-tested at the beginning and end of each cycle. Educational levels as well as job performance evaluations will be obtained.

Accomplishments

All learners were pre-tested and those that completed (249/77%) were post-tested. Educational gains as well as gains in self-esteem were obtained. It was difficult to obtain hard data on increased productivity and attendance at work because managers didn't always respond to these questions. Although we do not have hard data on increased productivity and attendance at work, managers who did respond to these questions felt that participating workers were either productive and had good attendance already or they had improved in these areas.

Objective 5

A minimum of five meetings with the outside project evaluator will be held, to conduct and benefit from on-going evaluation.

Accomplishments

The outside evaluator, Nancy Siefer, met with the Project Manager, Linda Hellman, and the staff of the Workplace Education Project five times over the course of the grant period. The meetings included on-site visits to participating companies, advisory committee meetings, and staff meetings with the instructors. The evaluation process and activities are described in more detail on pages 7 & 8 in this Final Report.

Objective 6

Information about the project and materials developed will be disseminated to the Curriculum Coordination Center and the ERIC Clearinghouse. The project will be presented at one or more national or statewide conferences.

Accomplishments

Linda Hellman, Project Manager for PCAE's Workplace Education Project, co-presented at the Project Directors' Meeting in Washington, D.C. in May, 1991 on "What Works and What Doesn't." Linda co-presented twice on workplace education at International TESOL (Teachers of English to Speakers of Other Languages) in Vancouver, B.C., Canada, in March 1992. She also presented in Tucson at the Society for Human Resource Managers. Ellen Grieser, Manufacturing Training Manager for Burr-Brown Corporation, co-presented at the Project Directors' September, 1992 Close-Out Meeting in Washington, D.C. on the role of business in curriculum writing. Since Burr-Brown is one of PCAE's workplace sites, this too was dissemination of information about our project.

Many articles have been written about the Workplace Education Project. "Paychecks and Report Cards" an article written about PCAE's Workplace Education Project appeared in the June 5, 1991 issue of Tucson Weekly. Linda wrote an article for TESOL's Adult Education Newsletter, published in February, 1992, on the Workplace Education Project. Recently, an article was published in the Bureau of Business Practice's Employees Relations Bulletin entitled "A Partnership in Learning"

about the Workplace Education Project. The United States Department of Education highlighted PCAE's Workplace Education Project as an exemplary program in its publication Workplace Literacy: Reshaping the American Workforce. All four articles mentioned above are included in the Appendix of this Final Report.

The Project Manager has sent information and materials in response to requests from numerous adult education providers, workplace education providers, and researchers. Materials and information were disseminated to the Department of Education of Puerto Rico; Northeast Metro Technical College in Minnesota; the School Board of Palm Beach, Florida; the New Britain Adult Education Center in Connecticut; the University of Arizona; the Arizona State University and University of California at Berkeley. The Project Manager will send the Workplace Education Project's final report, evaluation, and other materials to the Curriculum Coordination Center and the ERIC Clearinghouse on Adult, Career, and Vocational Education. Curriculums will be sent to the Center for Applied Linguistics National Clearinghouse on Literacy Education in response to its request.

CURRICULUM

All curriculums used in the workplace education classes were developed by the staff of the Workplace Education Project. The curriculum linked the goals of both the participating workers and the individual companies, making the instruction learner-centered and participatory.

During the extension period of the grant, the instructors combined all the company specific curriculums together by subject (reading, writing, math, and ESOL) and developed a generic curriculum for each content area. These curriculums will be used by instructors in the Workplace Education Project to customize from, rather than reinvent the wheel each time we begin a class at a new company. These curriculums can also benefit other workplace education providers.

In ESOL, the instructors met with supervisors, managers, and workers to identify tasks where the need for English appears to be the greatest. These tasks were categorized into a limited number of topic areas and linguistic functions were determined for each task. In reading, writing, and math (Math Fundamentals, Math for S.P.C., and Algebra), the curriculums include scope and sequence for each content area. In addition, job-specific curriculum matrixes were developed by compiling all job titles served with the basic skills necessary to perform each job. Generic and job-specific curriculums are included in the Appendix of this Final Report.

STAFF DEVELOPMENT

All staff involved in the Workplace Education Project received one-to-one and small group training with the Project Manager and Lead Teacher on an on-going basis. Topics covered included task analysis, assessment, curriculum writing, lesson planning, evaluation, and student support services. Teachers also met regularly to share ideas, lessons, etc. The Project Manager conducted on-going observations of every class at every workplace.

Pima County Adult Education also has an extensive in-service staff development program and staff working in this Project benefitted from both PCAE's program and the specific training offered through the Workplace Education Project. In addition, the Lead Teacher attended several conferences on workplace literacy and adult education, including AAACE (American Association of Adult and Continuing Education) in Anaheim, California and Jorie Philippi's Strategies for Designing Workplace Literacy Programs in Scottsdale, Arizona. The Project Manager and one ESOL instructor went to the International TESOL Conference in Vancouver, Canada.

ADVISORY COMMITTEES

Advisory Committees were formed which included representatives from the training or human resource department of the company, managers, students, instructors, and the Project Manager . The groups met a minimum of once a cycle to discuss how the class/es were going, any problems or concerns, suggestions for improvement, ideas for future classes, etc. The advisory committees were a very useful tool for keeping the classes relevant, participatory, and learner-centered. Aside from the Advisory Committees, we conducted on-site planning meetings and task analyses at every worksite, which incorporated workers' input.

EVALUATION

The Workplace Education Project utilized Nancy Siefer as our outside evaluator. Her expertise in workplace literacy has been invaluable in guiding the Project and helping it become an exemplary program. Nancy's primary focus was quality. PCAE's Workplace Education Project worked with Nancy from the initial stages to the end of the grant cycle. Not only was the program evaluated on an on-going basis, but also each class, instructor, and student were evaluated. The four levels of evaluation which follow list who or what were evaluated in each level and by whom.

LEVELS OF EVALUATION

What/Who is to be Evaluated	Evaluator
Worker	Instructor, supervisor, self
Instructor	Workers, self, Project Manager
Course	Workers, instructors, supervisors, Project Manager, outside evaluator
Program	Workers, instructors, supervisors, Project Manager, advisory committees, outside evaluator

The Final External Evaluation Report is included with this Final Report.

ADDITIONAL INFORMATION

Pima County Adult Education's Workplace Education Project tested a random sample of approximately 75 workers at Burr-Brown in reading using the Advanced TABE (Tests of Adult Basic Education). This was to ascertain a baseline average of workers' skills in reading. We also performed readability studies on Burr-Brown's work-related and generic materials. We plan to test a random sample of workers in math and put grade levels to Burr-Brown's math materials as well. Burr-Brown is in the process of setting up a computer lab for its education and training department. The participating workers will be able to use the computers for basic skills enhancement in addition to attending classes.

Aside from our federal grant, the Workplace Education Project provided Skills Enhancement Classes to Arizona Department of Economic Security (DES) workers. This is an innovative project because it involves a partnership between two governmental agencies. In 1991-1992, PCAE trained 127 DES employees in reading and writing through a special grant. These funds included the production of a 20-minute video on workplace literacy entitled "Skills for Success", which highlighted Pima County Adult Education's Workplace Education Project, Phoenix Union High School District (our counterparts in Phoenix), and DES. Also featured on the video was the Burr-Brown Corporation as an example of a business committed to workplace education. We have also provided non-grant related classes to employers requesting our services that are not members of the Arizona Consortium for Education and Training or the Southern Arizona Innkeepers' Association on a cost-per-class basis.

OUTCOMES

The following pages give statistics on the number and characteristics of project participants who did and did not complete the program as well as the measurable learning gains. In this report, we have identified "completers" as the workers who completed two-thirds or more of the classroom time offered in each cycle.

Our statistics indicate that 249 participants (77%) out of 322 participants served completed project activities and 73 participants (23%) did not. Many of our "non-completers" were laid off while they were enrolled in workplace education classes. Since our goal was to train 230 workers, we are pleased to have 249 workers who completed the programs at their worksites.

PCAE instructors pre-tested every participant at every location when he/she entered the workplace education class. The instructors post-tested at the end of each cycle, which ranged from 8-13 weeks in length. A total of 185 workers tested higher in basic skills and another 94 improved their communication skills. All 249 completers and 30 non-completers had learning gains documented by pre-/post-test results or determined by teachers, supervisors, or workers themselves. Workers' evaluations of the classes documented increases in self-esteem.

In ESOL, PCAE used teacher-designed pre- and post-assessments. The instructors and the Project Manager developed the assessments according to the specific curriculum at each workplace. The tests were scored on a holistic scale of 0-6:

0 - pre-beginning
1 and 2 - beginning
3 and 4 - intermediate
5 and 6 - advanced

The test components included speaking, listening, reading, and writing. Students were scored on every component and an average overall score was also given to each student. For example, a student might begin the class with an average overall score of 1.3 and post-test at 2.7. A sample ESOL pre- and post-test is included in the Appendix of this Final Report.

Several types of assessments were used in the basic skills areas. For the math classes (Math Fundamentals and Algebra), PCAE instructors designed pre- and post-assessments. These assessments were written with two goals in mind: 1) to assess skill levels that had been determined through prior task analyses to be necessary for job competency and 2) to write math word problems at a reading level appropriate for the group. After administering these assessments, instructors provided each student with an individualized item analysis of his/her strengths and needs, as determined by the assessment. The item analyses were repeated for the post-assessments. This procedure enabled students to pinpoint areas in which they had made the most significant gains. Sample pre- and post-assessments for Math Fundamentals are included in the Appendix of this Final Report as well as pre- and post-test score comparisons from Burr-Brown's Math Fundamentals class.

In reading, the instructor created a reading assessment utilizing company material. The cloze approach was used on a passage taken from the employee handbook. Different selections were used for the pre- and post-tests.

In the writing classes, a student writing sample was taken. The writing samples were scored holistically. The Workplace Education Project's Holistic Scoring Guidelines are included in the Appendix of this Final Report. We also tested students using the Language Mechanics and Language Expression portions of the TABE (Tests of Adult Basic Education), Level A, Forms 5 & 6. Although the TABE uses grade levels to document results, we provided students and employers the results in a percentage format. When we gave employers the results of the pre- and post-test scores, we did not use workers' names and reported the results in composite form. Students' learning gains from pre- to post-test are one indicator of how successful the classes have been and are a valuable marketing tool.

NATIONAL WORKPLACE LITERACY PROGRAM
INFORMATION FORM

Completers
Pima County Adult Education
Workplace Education Project
March 1, 1991 - November 30, 1992

Part 1: Program Parameters

1. Number of Completers: 249

2. No. Served at Each Site to Date:

Site 1.	49	Site 6.	1
Site 2.	68	Site 7.	9
Site 3.	91	Site 8.	6
Site 4.	9	Site 9.	
Site 5.	16	Site 10.	

3. Total No. Served: 249

4. Fed. Funds Obligated: _____

5. Matching Funds/ In-Kind: _____

6. Value Release Time: _____

7. No. Participating in Programs Offered

Basic Skills	162
GED	9
ESL	78

8. Contact Hours Provided: _____

Part 2: Participation Data

1. Mean Age Participants: 37

2. Sex: No. Males 81 No. Females 168

3. Race/Ethnicity: No. who are:

White	77	Am. Indian/ Alaska Native	1
Black	8		
Hispanic	83	Asian/Pacific Islander	80

4. No. Single Head of Household: 61

5. No. Limited English Proficient: 95

Outcomes	No. Participants
a. Tested higher on basic skills	171
b. Improved communication skills	78
c. Increased productivity	
d. Improved attendance at work	
e. Increased self-esteem	249

7. Years with the company	No. Participants
Unemployed	
0-5	138
6-10	60
11-15	34
16-over	17

NATIONAL WORKPLACE LITERACY PROGRAM
INFORMATION FORM

Non-Completers
Pima County Adult Education
Workplace Education Project
March 1, 1991 - November 30, 1992

Part 1: Program Parameters

1. Number of Non-Completers: 73

2. No. Served at Each Site to Date:

Site 1. 22	Site 6. 1
Site 2. 14	Site 7. 7
Site 3. 18	Site 8. 2
Site 4.	Site 9.
Site 5. 9	Site 10.

3. Total No. Served: 73

4. Fed. Funds Obligated:

5. Matching Funds/ In-Kind:

6. Value Release Time:

7. No. Participating in Programs Offered

Basic Skills	48
GED	9
ESL	16

8. Contact Hours Provided:

Part 2: Participation Data

1. Mean Age Participants: 35

2. Sex: No. Males 29 No. Females 44

3. Race/Ethnicity: No. who are:

White 22	Am. Indian/
Black 9	Alaska Native 1
Hispanic 24	Asian/Pacific
	Islander 17

4. No. Single Head of Household: 18

5. No. Limited English Proficient: 24

Outcomes	No. Participants
a. Tested higher on basic skills	14
b. Improved communication skills	16
c. Increased productivity	
d. Improved attendance at work	
e. Increased self-esteem	30

7. Years with the company	No. Participants
Unemployed	
0-5	40
6-10	21
11-15	11
16-over	1

APPENDIX

Generic Workplace Curriculums

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT
GENERIC READING SKILLS CURRICULUM

1.0 MAIN IDEA
- 1.1 Identifying the Main Idea (stated)
- 1.2 Identifying the Main Idea (unstated)

2.0 GETTING THE FACTS
- 2.1 Identifying the Facts
- 2.2 Finding an Implied Fact
- 2.3 Distinguishing Between Fact and Opinion
- 2.4 Combining Facts
- 2.5 Evaluating Factual Data

3.0 DRAWING CONCLUSIONS
- 3.1 Identifying a Conclusion
- 3.2 Evaluating a Conclusion
- 3.3 Identifying Conclusions and Generalizations from a Paragraph

4.0 CAUSE AND EFFECT
- 4.1 Identifying Literal Cause and Effect
- 4.2 Identifying Implied Cause and Effect
- 4.3 Evaluating Cause and Effect Statements

5.0 DETAILS
- 5.1 Finding Details in a Paragraph
- 5.2 Identifying Supporting Details in a Paragraph
- 5.3 Identifying Nonsupporting Details in a Paragraph

6.0 SEQUENCING
- 6.1 Determining Ordered Events in a Paragraph
- 6.2 Identifying "Sequencing" Words

7.0 DIRECTIONS
- 7.1 Following Literal Written Directions
- 7.2 Determining Direction Sequence

8.0 UTILIZING INFORMATION
- 8.1 Utilizing Information from Pictures, Maps and Signs
- 8.2 Utilizing Information from Diagrams, Tables, Charts, Graphs and Schedules
- 8.3 Utilizing Information from Indexes, Tables of Contents or the Dictionary

9.0 COMPARISON AND CONTRAST

10.0 SUMMARIZING AND PARAPHRASING
- 10.1 Summarizing a Written Interview
- 10.2 Paraphrasing a Narrative

11.0 STRUCTURE
- 11.1 Recognizing Structural Elements in a Reading Selection
- 11.2 Analyzing Structural Elements in a Reading Selection

12.0 CRITICAL THINKING SKILLS
- 12.1 Identifying Author's Writing Techniques
- 12.2 Identifying Author's Purpose
- 12.3 Analyzing Organizational Patterns
- 12.4 Analyzing Organizational Relationships

13.0 SKIMMING AND SCANNING

14.0 VOCABULARY
- 14.1 Recognizing Root Word
- 14.2 Recognizing Suffixes
- 14.3 Recognizing Prefixes
- 14.4 Understanding Compound Words
- 14.5 Antonyms
- 14.6 Synonyms
- 14.7 Homonyms
- 14.8 Workplace Specific Vocabulary

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT
GENERIC WRITING SKILLS CURRICULUM

1.0 SENTENCE STRUCTURE
- 1 .2 Subject/Verb
- 1. 3 Fragments/Run-ons
- 1. 4 Simple/Compound/Complex Sentences
- 1. 4 Declarative/Imperative/Interrogative/Exclamatory Sentences

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    - 2.13b Number
    - 2.13c Gender
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    - 2.22b Number
    - 2.22c Gender

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  - 2.83 Conjunctive Adverbs
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- 2 .9 Interjections

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- 3. 2 Infinitive Phrases
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- 3. 5 Participial Phrases
- 3. 6 Dependent Clauses
- 3. 7 Adjective Clauses
- 3. 8 Adverbial Clauses
- 3. 9 Noun Clauses
- 3.10 Independent Clauses

4.0 PARALLEL CONSTRUCTION

5.0 PUNCTUATION and CAPITAL LETTERS
- 5. 1 Ending Punctuation
- 5. 2 Commas
- 5. 3 Quotation Marks
- 5. 4 Colons
- 5. 5 Semi-Colons
- 5. 6 Hyphens

6.0 PROOFREADING/EDITING
- 6. 1 Correcting Shift in Time
- 6. 2 Correcting Shift in Person
- 6. 3 Correcting Wordiness
- 6. 4 Avoiding Cliches
- 6. 5 Correcting Misplaced Modifiers
- 6. 6 Correcting Plural/Possessive Errors
- 6. 7 Correcting Letters, Memos, Reports
- 6. 8 Expressing Numbers Correctly
- 6. 9 Editing Rough Drafts
- 6.10 Editing for Completeness
- 6.11 Editing for Cohesiveness
- 6.12 Editing for Conciseness
- 6.13 Editing for Clearness
- 6.14 Editing for Courteousness
- 6.15 Editing Business Letters
- 6.16 Editing Business Memos

7.0 WRITING ACTIVITIES
- 7. 1 Writing Narrative Paragraphs
- 7. 2 Writing Persuasive Paragraphs
- 7. 3 Writing Descriptive Paragraphs
- 7. 4 Writing Expository Paragraphs
- 7. 5 Writing Incident Reports
- 7. 6 Resume Writing
- 7. 7 Business Letters

7.71 Request letters
7.72 Acknowledgments
7.73 Sales letters
7.74 Claim and Adjustment letters
7.75 Public Relations letters
7.76 Goodwill letters
7.77 Appreciation letters

7. 8 Memo Writing
7. 9 Report Writing
7.10 Journal Writing
7.11 Free Writing
7.12 Goal Setting
7.13 Performance Appraisals

8.0 SPELLING

8. 1 List of Frequently Misspelled Words
8. 2 Special Consonant Sounds: "S", "Sh", "Ch", "Zh", "J", "F", "K"
8. 3 Double Consonants
8. 4 Silent Consonants
8. 5 Silent Vowels
8. 6 Spelling Errors Related to Pronunciation
8. 7 Reduced Vowel Roots: "A", "E", "Er", "I", "O", "Or", "U"
8. 8 Reduced Vowel Suffixes: "ent/ence", "ant/ance", "or/ar", "able/ible", "le/el/al/", "ary/ery/ory", ain/on/om", "acy/asy"
8. 9 Rule for Doubling Final Consonants
8.10 Individual List of Misspelled Words
8.11 Words Often Confused
8.12 Words That Sound Alike
8.13 Possessives
8.14 Contractions

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT
GENERIC MATH FUNDAMENTALS CURRICULUM

1.0 WHOLE NUMBERS SKILLS
- 1. 1 Place Value
- 1. 2 Addition Computation
- 1. 3 Addition Applications
- 1. 4 Subtraction Computation
- 1. 5 Subtraction Applications
- 1. 6 Multiplication Computation
- 1. 7 Multiplication Applications
- 1. 8 Division Computation
- 1. 9 Division Applications
- 1.10 Averages

2.0 FRACTION SKILLS
- 2. 1 Introduction to Fractions
  - 2.1a Numerator
  - 2.1b Denominator
  - 2.1c Proper Fractions
  - 2.1d Improper Fractions
  - 2.1e Reducing Fractions
  - 2.1f Comparing Fractions
- 2. 2 Addition of Fractions Computation
- 2. 3 Addition of Fractions Applications
- 2. 4 Subtraction of Fractions Computation
- 2. 5 Subtraction of Fractions Applications
- 2. 6 Multiplication of Fractions Computation
- 2. 7 Multiplication of Fractions Applications
- 2. 8 Division of Fractions Computation
- 2. 9 Division of Fractions Applications

3.0 DECIMAL SKILLS
- 3. 1 Reading Decimals
- 3. 2 Writing Decimals
- 3. 3 Comparing Decimals
- 3. 4 Addition of Decimals Computations
- 3. 5 Addition of Decimals Applications
- 3. 6 Subtraction of Decimals Computations
- 3. 7 Subtraction of Decimals Applications
- 3. 8 Multiplication of Decimals Computations
- 3. 9 Multiplication of Decimals Applications
- 3.10 Division of Decimals Computation
- 3.11 Division of Decimals Applications

4.0 PERCENT SKILLS
- 4.1 Finding a Percent of a Number
- 4.2 Finding Percents Applications
- 4.3 Finding a Number When a Percent is Given
- 4.4 Determining Percent Increase
- 4.5 Determining Percent Decrease
- 4.6 Using Percents: The Percent Circle

5.0 MATH INTEGRATION
- 5.1 Changing Fractions to Decimals
- 5.2 Changing Fractions to Percents
- 5.3 Changing Decimals to Fractions
- 5.4 Changing Decimals to Percents
- 5.5 Changing Percents to Decimals
- 5.6 Changing Percents to Fractions
- 5.7 Decimal Percents
- 5.8 Fractional Percents

6.0 APPROXIMATION
- 6.1 Using approximation in Problem Solving
- 6.2 Using approximation in Word Problems

7.0 MEASUREMENT SKILLS
- 7.1 English Measurement
- 7.2 Metric Measurement

8.0 INTEREST FORMULA
- 8.1 Interest
- 8.2 Definition of Rate
- 8.3 Definition of Time
- 8.4 Interest Earned
- 8.5 Interest Paid
- 8.6 Finding the Total Owed
- 8.7 Finding the Balance Owed
- 8.8 Computing Interest for Part of the Year

9.0 DATA ANALYSIS SKILLS
- 9.1 Finding the Mean
- 9.2 Finding the Median
- 9.3 Finding the Range
- 9.4 Finding the Ratio
- 9.5 Displaying Numerical Data

10.0 GRAPH SKILLS
- 10.1 Pictograph
- 10.2 Bar Graph
- 10.3 Circle Graph
- 10.4 Line Graph

11.0 PROBABILITY

12.0 MATHEMATICAL FORMULAS
- 12.1 Ration
- 12.2 Proportion
- 12.3 Area
  - 12.3a Computing the area of a square
  - 12.3b Computing the area of a rectangle
  - 12.3c Computing the area of a parallelogram
  - 12.3d Computing the area of a triangle
  - 12.3e Computing the area of a circle
- 12.4 Perimeter
  - 12.4a Computing the area of a square
  - 12.4b Computing the area of a rectangle
  - 12.4c Computing the area of a triangle
  - 12.4d Circumference of a circle
- 12.5 Volume
  - 12.5a Computing the volume of a cube
  - 12.5b Computing the volume of a rectangle
  - 12.5c Computing the volume of a container
  - 12.5d Computing the volume of a cylinder

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT
MATH FOR GENERIC S.P.C. CURRICULUM

1.0 DATA COLLECTION
- 1.1 Types of Data
  - 1.1a Variable Data
  - 1.1b Attribute Data
- 1.2 Tally Charts and Check Sheets

2.0 MATH SKILLS FOR S.P.C.
- 2.1 Using A Calculator
- 2.2 Finding The Mean
- 2.3 Finding The Median
- 2.4 Finding The Range
- 2.5 Rounding
- 2.6 Finding Percent

3.0 GRAPHING SKILLS FOR S.P.C.
- 3.1 Principles of Graphing
  - 3.1a Reading Axes
  - 3.1b Plotting Points
  - 3.1c Interpolation
  - 3.1d Control Limits
- 3.2 Variable Control Chart
- 3.3 Attribute Control Chart
- 3.4 Other Chart Types

4.0 S.P.C. PROBLEM SOLVING
- 4.1 In Control And Out Of Control
- 4.2 Interpreting Control Chart Patterns
- 4.3 Histograms
- 4.4 Pareto Analysis
  - 4.4a Benefits
  - 4.4b Procedure

5.0 APPLICATION

Specific applications of these principles will depend upon the idiosyncratic programs and materials of each company.

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT
GENERIC ALGEBRA CURRICULUM

1.0 ALGEBRAIC LANGUAGE
- 1.1 Using Letters for Numbers
- 1.2 Showing Operations in Equations
  - 1.2 a Adding
  - 1.2 b Subtracting
  - 1.2 c Multplying
  - 1.2 d Dividing
- 1.3 Exponents
  - 1.3 a What are Exponents?
  - 1.3 b Using Exponents
- 1.4 Square Roots
  - 1.4 a What are Square Roots?
  - 1.4 b Calculating an Approximate Square Root
- 1.5 Using Parentheses
- 1.6 Order of Operations
- 1.7 Formulas
  - 1.7 a Reading Formulas
  - 1.7 b Applying Formulas
- 1.8 Applications
  - 1.8 a F to C Formula
  - 1.8 b Find Area in English Units
  - 1.8 c Find Area in Metric Units
  - 1.8 d Apply Simple Interest Formula
  - 1.8 e Apply Compound Interest Formula
  - 1.8 f Change English to Metric Units
  - 1.8 g Change Metric to English Units
  - 1.8 h Find Circumference & Perimeter in English Units
  - 1.8 i Find Circumference & Perimeter in Metric Units

2.0 SIGNED NUMBERS
- 2.1 Number Line
- 2.2 Ordering Signed Numbers
- 2.3 Add Signed Numbers
- 2.4 Subtract Signed Numbers
- 2.5 Multiply Signed Numbers
- 2.6 Divide Signed Numbers
- 2.7 Applications
  - 2.7 a Reading a Digital Scale with Signed Numbers
  - 2.7 b Reading an Analog Scale with Signed Numbers
  - 2.7 c Finding the Mean with Signed Numbers
  - 2.7 d Finding the Median with Signed Numbers
  - 2.7 e Finding the Range with Signed Numbers

3.0 SOLVING EQUATIONS WITH 1 UNKNOWN
- 3.1 What is an equation?
- 3.2 Solve by Subtraction
- 3.3 Solve by Addition
- 3.4 Solve by Division
- 3.5 Solve by Multiplication
- 3.6 Solve Fractional Equation
- 3.7 Solve by 2 Steps
- 3.8 Solve by Collecting Terms
  - 3.8 a Collecting Terms on 1 Side
  - 3.8 b Collecting Terms on Both Sides
- 3.9 Solve Equations with Parentheses
- 3.10 Applications
  - 3.10 a Assigning Variables to Real Problems
  - 3.10 b Setting Up an Equation for Real Problems
  - 3.10 c Rate of Work Problems
  - 3.10 d Mixture Problems with Chemicals

4.0 RATIO AND PROPORTION
- 4.1 What is Ratio?
- 4.2 Setting Up and Reducing Ratio
- 4.3 What is Proportion?
- 4.4 Setting Up a Proportion
- 4.5 Solving a Proportion Problem
- 4.6 Applications
  - 4.6 a Mixing Paint
  - 4.6 b Making Medicinal Solutions
  - 4.6 c Making Chemical Solutions
  - 4.6 d Mixing Cement

5.0 SOLVING EQUATIONS WITH 2 UNKNOWNS
- 5.1 Rearranging Equations
- 5.2 Substituting to Solve

6.0 POLYNOMIALS
- 6.1 Naming Polynomials
  - 6.1a Coefficients, Unknowns, Terms
- 6.2 Recognizing Like Terms
- 6.3 Adding & Subtracting Like Terms
- 6.4 Multiplying & Dividing Like Terms
- 6.5 Exponents in Polyunomials
  - 6.5 a Multiplying Exponents
  - 6.5 b Divding Exponents

7.0 GRAPHING

- 7.1 What are Rectangular Coordinates?
- 7.2 Writing Coordinates as an Ordered Pair
- 7.3 Plotting Coordinates on Cartesian Plane
- 7.4 Plot the Equation of a Line
- 7.5 Find the X and Y Intercepts of a Line
- 7.6 Slope
  - 7.6 a Understanding Slope
  - 7.6 b Computing Slope
- 7.7 Graphing Non-Linear Equations
- 7.8 Applications
  - 7.8 a Graph Production Data
  - 7.8 b Find Distance Between 2 Points

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT
ESOL CURRICULUM

TOPICS	TASKS	FUNCTIONS
Personal Information	identify self and some co-workers introduce self to co-workers	asking for + giving information expressing wants, desires, needs introducing, greeting, taking leave
Socializing at Work	ask about co-workers' families and activities greet co-workers, boss, and other worker acquaintances	describing events/problems/ situations/processes asking + giving opinion introducing, greeting, taking leave making small talk
Tools, Supplies, Equipment and Materials	describe a procedure just completed direct someone to a place explain the danger of certain hazardous materials identify and describe tools or supplies required for a task understand and explain company clothing requirements	asking for + giving directions/ instructions/information/ reasons/ permission informing
Learning, Doing and Teaching the Job	ask for interpretation of charts, graphs and diagrams describe a procedure just completed describe anomalies in a common procedure explain a mistake look up specifications for a particular job make an oral suggestion for improvement of work process plot data on a graph read, interpret and explain charts, graphs and diagrams request help to complete a task respond to criticism from a supervisor understand and explain work tolerances verify a new process or procedure write a short note describing a task left incomplete	admitting - denying suggesting, recommending + asking for advice asking for + giving directions/ instructions/information/ reasons/permission asking for + giving opinion asking for + offering + accepting help, things checking + indicating understanding clarifying, correcting, rephrasing, summarizing, repeating + asking for clarification, correction, repetition describing events/problems/ situations/processes expressing certainty/doubt/ suspicion informing

Company Policy (sick & vacation leave, pay, accidents, forms)	ask about and explain changes in paycheck deductions call in sick, late or absent describe preferences of hours, shift, assignment fill out application form fill out health form fill out time card fill out W2 form understand and explain company attendance policy understand and explain company clothing requirements understand and explain company handbook understand and explain company leave policy understand and explain company safety regulations	asking for + giving directions/ instructions/information/ reasons/permission asking for + giving opinion clarifying, correcting, rephrasing, summarizing, repeating + asking for clarification, correction, repetition expressing likes - dislikes/ preferences expressing wants, desires, needs informing making + accepting excuses mediating, negotiating, conceding, compromising reminding
Health and Safety	read and explain hazardous warning labels report an accident respond to written and oral warnings of danger understand and explain company safety regulations warn a co-worker of imminent danger	cautioning describing events/problems/ situations/processes interrupting reminding
Pay and Benefits	read and explain payroll deductions from pay stub understand and explain company leave policy understand and explain benefits	clarifying, correcting, rephrasing, summarizing, repeating + asking for clarification, correction, repetition expressing likes - dislikes/ preferences expressing wants, desires, needs mediating, negotiating, conceding, compromising
Performance Review (Evaluations)	request feedback from supervisor on job performance ask about opportunities/ requirements for promotion respond to criticism from a supervisor	hesitating, stalling mediating, negotiating, conceding, compromising soliciting feedback & opinions
Working in Teams	describe a procedure just completed identify self and some co-workers make an oral suggestion for improvement of work process ask for clarification, repetition express agreement/disagreement indicate understanding of proceedings	suggesting, recommending + asking for advice agreeing - disagreeing expressing likes - dislikes/ preferences interrupting mediating, negotiating, conceding, compromising

Not all tasks and functions are taught at every worksite nor for every job category. The ESOL teacher selects from these items to design a curriculum appropriate to each class.

Job-Specific Matrixes

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S MATH CURRICULUM MATRIX

COMPETENCIES / OCCUPATIONS	WHOLE NUMBERS	FRACTIONS	DECIMALS	PERCENTS	ENGLISH MEASURE	METRIC MEASURE	AVERAGE	RATIO/ PROPORTION	TABLES/CHARTS/ GRAPHS/MAPS	PERIMETER/ AREA/VOLUME	OTHER GEOMETRY	ALGEBRA	ESTIMATION	SCALE DRAWINGS	CALCULATOR
ACCOUNTING/CLERK BOOKKEEPING	X	X	X	X			X	X	X				X		X
AUTO MECHANIC	X	X	X	X	X	X	X		X		X		X	X	X
CASHIER	X		X	X											X
CASTER	X	X	X		X	X		X	X	X	X			X	X
COOK	X	X	X		X			X					X	X	X
CUSTODIAN	X			X	X			X					X		X
CUSTODIAL SUPERVISOR	X		X	X	X			X					X		X
CUSTOMER SERVICE REP.	X		X												X

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S MATH CURRICULUM MATRIX

COMPETENCIES / OCCUPATIONS	WHOLE NUMBERS	FRACTIONS	DECIMALS	PERCENTS	ENGLISH MEASURE	METRIC MEASURE	AVERAGE	RATIO/ PROPORTION	TABLES/CHARTS/ GRAPHS/MAPS	PERIMETER/ AREA/VOLUME	OTHER GEOMETRY	ALGEBRA	ESTIMATION	SCALE DRAWINGS	CALCULATOR
DATA ANALYST	X	X	X	X			X	X	X			X	X	X	X
DATA ENTRY CLERK	X		X						X						X
DIE ATTACH OPERATOR	X	X	X	X	X	X	X	X	X	X	X		X	X	X
DIRECT CARE WORKER	X		X	X											X
DRIVER	X		X		X				X				X		X
ELECTRONICS ASSEMBLER	X	X	X	X	X	X	X		X				X	X	X
ENGINEERING ASSISTANT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FOOD SERVICE WORKER	X	X	X		X			X	X	X			X		X

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PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S MATH CURRICULUM MATRIX

OCCUPATIONS / COMPETENCIES	WHOLE NUMBERS	FRACTIONS	DECIMALS	PERCENTS	ENGLISH MEASURE	METRIC MEASURE	AVERAGE	RATIO/ PROPORTION	TABLES/CHARTS/ GRAPHS/MAPS	PERIMETER/ AREA/VOLUME	OTHER GEOMETRY	ALGEBRA	ESTIMATION	SCALE DRAWINGS	CALCULATOR
FORKLIFT OPERATOR	X		X							X			X		X
GROUNDSKEEPER	X	X	X	X	X		X	X	X	X	X		X	X	X
HEALTH CLERK	X	X	X	X	X										X
HOUSEKEEPER	X						X						X		X
LASER PROBE OPERATOR	X	X	X	X			X	X	X	X			X	X	X
LAUNDRY WORKER	X			X			X	X					X		X
MACHINIST/ TOOL MAKER	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MAINTENENCE WORKER	X	X	X	X	X	X	X	X	X	X	X		X	X	X

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PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S MATH CURRICULUM MATRIX

COMPETENCIES / OCCUPATIONS	WHOLE NUMBERS	FRACTIONS	DECIMALS	PERCENTS	ENGLISH MEASURE	METRIC MEASURE	AVERAGE	RATIO/ PROPORTION	TABLES/CHARTS/ GRAPHS/MAPS	PERIMETER/ AREA/VOLUME	OTHER GEOMETRY	ALGEBRA	ESTIMATION	SCALE DRAWINGS	CALCULATOR
MANUFACTURING TECHNICIAN															
NURSES' AIDE	X	X	X	X	X	X	X	X	X				X		X
OPERATIONS COORDINATOR	X		X	X			X	X	X				X		X
PAINTER	X	X	X	X	X			X	X	X			X	X	X
PLUMBER	X	X	X	X	X	X	X	X	X	X	X		X	X	X
RECEPTIONIST	X														X
REHABILITATION TECH.	X	X	X	X	X					X					X
RESIDENTIAL SUPERVISOR	X		X	X					X						X

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PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S MATH CURRICULUM MATRIX

COMPETENCIES / OCCUPATIONS	WHOLE NUMBERS	FRACTIONS	DECIMALS	PERCENTS	ENGLISH MEASURE	METRIC MEASURE	AVERAGE	RATIO/ PROPORTION	TABLES/CHARTS/ GRAPHS/MAPS	PERIMETER/ AREA/VOLUME	OTHER GEOMETRY	ALGEBRA	ESTIMATION	SCALE DRAWINGS	CALCULATOR
SALES/MARKETING	X	X	X	X			X	X	X				X		X
SECRETARY CLERK TYPIST	X		X						X						X
SHIPPING CLERK/ SUPERVISOR	X	X	X		X		X		X	X			X		X
TOOL AND DIE OPERATOR	X	X	X	X	X		X				X	X	X	X	X

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PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S READING CURRICULUM MATRIX

COMPETENCIES / OCCUPATIONS	MAIN IDEA	GETTING THE FACTS	DRAWING CONCLUSIONS	CAUSE AND EFFECT	DETAILS	SEQUENCING	DIRECTIONS	UTILIZING INFORMATION	COMPARISON AND CONTRAST	SUMMARIZING/ PARAPHRASING	STRUCTURE	CRITICAL THINKING SKILLS	SKIMMING AND SCANNING	VOCABULARY	ORGANIZING INFORMATION
ACCOUNTING/CLERK BOOKKEEPING	X	X	X	X	X	X	X	X			X	X	X	X	X
AUTO MECHANIC	X	X	X	X	X		X	X	X		X	X		X	X
CASHIER	X	X	X	X	X	X	X	X				X		X	X
CASTER	X	X		X	X	X	X	X				X		X	X
COOK		X		X	X	X	X	X				X		X	X
CUSTODIAN	X	X		X	X		X	X				X		X	X
CUSTODIAL SUPERVISOR	X	X	X	X	X		X	X	X		X	X	X	X	X
CUSTOMER SERVICE REP.	X	X	X		X	X	X	X	X			X		X	X

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S READING CURRICULUM MATRIX

OCCUPATIONS / COMPETENCIES	MAIN IDEA	GETTING THE FACTS	DRAWING CONCLUSIONS	CAUSE AND EFFECT	DETAILS	SEQUENCING	DIRECTIONS	UTILIZING INFORMATION	COMPARISON AND CONTRAST	SUMMARIZING/ PARAPHRASING	STRUCTURE	CRITICAL THINKING SKILLS	SKIMMING AND SCANNING	VOCABULARY	ORGANIZING INFORMATION
DATA ANALYST	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DATA ENTRY CLERK	X	X			X	X	X			X				X	X
DIE ATTACH OPERATOR	X	X	X		X	X	X	X			X	X		X	X
DIRECT CARE WORKER	X	X	X	X	X	X	X	X	X			X		X	X
DRIVER	X	X	X	X	X	X	X	X		X		X			X
ELECTRONICS ASSEMBLER	X	X	X	X	X	X	X	X	X			X		X	X
ENGINEERING ASSISTANT	X	X	X	X	X		X	X				X		X	X
FOOD SERVICE WORKER	X	X			X		X	X						X	X

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S READING CURRICULUM MATRIX

COMPETENCIES / OCCUPATIONS	MAIN IDEA	GETTING THE FACTS	DRAWING CONCLUSIONS	CAUSE AND EFFECT	DETAILS	SEQUENCING	DIRECTIONS	UTILIZING INFORMATION	COMPARISON AND CONTRAST	SUMMARIZING/ PARAPHRASING	STRUCTURE	CRITICAL THINKING SKILLS	SKIMMING AND SCANNING	VOCABULARY	ORGANIZING INFORMATION
FORKLIFT OPERATOR	X	X			X		X	X				X		X	X
GROUNDSKEEPER	X	X			X		X					X		X	X
HEALTH CLERK	X	X	X		X	X	X	X	X			X		X	X
HOUSEKEEPER	X				X		X	X				X		X	X
LASER PROBE OPERATOR	X	X		X	X		X	X	X		X	X		X	X
LAUNDRY WORKER	X	X			X	X	X	X				X		X	X
MACHINIST/ TOOL MAKER	X	X	X		X		X	X			X	X		X	X
MAINTENENCE WORKER	X	X	X	X	X	X	X	X			X	X		X	X

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PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S READING CURRICULUM MATRIX

COMPETENCIES / OCCUPATIONS	MAIN IDEA	GETTING THE FACTS	DRAWING CONCLUSIONS	CAUSE AND EFFECT	DETAILS	SEQUENCING	DIRECTIONS	UTILIZING INFORMATION	COMPARISON AND CONTRAST	SUMMARIZING/ PARAPHRASING	STRUCTURE	CRITICAL THINKING SKILLS	SKIMMING AND SCANNING	VOCABULARY	ORGANIZING INFORMATION
MANUFACTURING TECHNICIAN	X	X	X	X	X		X	X			X	X		X	X
NURSES' AIDE	X	X		X	X	X	X	X		X	X	X	X	X	X
OPERATIONS COORDINATOR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PAINTER	X	X		X	X		X					X		X	X
PLUMBER	X	X	X	X	X	X	X	X	X			X		X	X
RECEPTIONIST	X	X			X		X					X		X	X
REHABILITATION TECH.	X	X	X	X	X	X	X	X	X	X		X		X	X
RESIDENTIAL SUPERVISOR	X	X	X	X	X	X	X	X	X	X		X		X	X

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PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S READING CURRICULUM MATRIX

COMPETENCIES / OCCUPATIONS	MAIN IDEA	GETTING THE FACTS	DRAWING CONCLUSIONS	CAUSE AND EFFECT	DETAILS	SEQUENCING	DIRECTIONS	UTILIZING INFORMATION	COMPARISON AND CONTRAST	SUMMARIZING/ PARAPHRASING	STRUCTURE	CRITICAL THINKING SKILLS	SKIMMING AND SCANNING	VOCABULARY	ORGANIZING INFORMATION
SALES/MARKETING	X	X	X	X	X	X	X	X	X	X		X		X	X
SECRETARY CLERK TYPIST	X	X	X		X	X	X	X		X		X	X	X	X
SHIPPING CLERK/ SUPERVISOR	X	X	X	X	X	X	X	X				X		X	X
TOOL AND DIE OPERATOR	X	X	X	X	X		X				X	X		X	X

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PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S WRITING CURRICULUM MATRIX

COMPETENCIES / OCCUPATIONS	SENTENCE STRUCTURE	PARTS OF SPEECH	PHRASES & CLAUSES	PARALLEL CONSTRUCTION	PUNCTUATION	CAPITALIZATION	PROOFREADING/ EDITING	NARRATIVE WRITING	PERSUASIVE WRITING	DESCRIPTIVE WRITING	EXPOSITORY WRITING	INCIDENT REPORT WRITING	BUSINESS LETTER WRITING	MEMO WRITING	SPELLING
ACCOUNTING/CLERK BOOKKEEPING	X	X	X	X	X	X	X	X			X	X	X	X	X
AUTO MECHANIC	X	X	X	X	X	X	X			X	X	X		X	
CASHIER	X	X	X	X	X	X	X					X		X	X
CASTER	X	X	X	X	X	X	X					X		X	X
COOK	X	X	X	X	X	X	X				X	X		X	X
CUSTODIAN	X	X	X	X	X	X	X	X		X	X	X		X	X
CUSTODIAL SUPERVISOR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CUSTOMER SERVICE REP.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S WRITING CURRICULUM MATRIX

OCCUPATIONS / COMPETENCIES	SENTENCE STRUCTURE	PARTS OF SPEECH	PHRASES & CLAUSES	PARALLEL CONSTRUCTION	PUNCTUATION	CAPITALIZATION	PROOFREADING/ EDITING	NARRATIVE WRITING	PERSUASIVE WRITING	DESCRIPTIVE WRITING	EXPOSITORY WRITING	INCIDENT REPORT WRITING	BUSINESS LETTER WRITING	MEMO WRITING	SPELLING
DATA ANALYST	X	X	X	X	X	X	X	X		X	X	X		X	X
DATA ENTRY CLERK	X	X	X	X	X	X	X	X		X	X	X		X	X
DIE ATTACH OPERATOR	X	X	X	X	X	X	X					X		X	X
DIRECT CARE WORKER	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DRIVER	X	X	X	X	X	X	X					X		X	X
ELECTRONICS ASSEMBLER	X	X	X	X	X	X	X					X		X	X
ENGINEERING ASSISTANT	X	X	X	X	X	X	X			X	X	X	X	X	X
FOOD SERVICE WORKER	X	X	X	X	X	X	X			X	X	X		X	X

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S WRITING CURRICULUM MATRIX

OCCUPATIONS / COMPETENCIES	SENTENCE STRUCTURE	PARTS OF SPEECH	PHRASES & CLAUSES	PARALLEL CONSTRUCTION	PUNCTUATION	CAPITALIZATION	PROOFREADING/ EDITING	NARRATIVE WRITING	PERSUASIVE WRITING	DESCRIPTIVE WRITING	EXPOSITORY WRITING	INCIDENT REPORT WRITING	BUSINESS LETTER WRITING	MEMO WRITING	SPELLING
FORKLIFT OPERATOR	X	X	X	X	X	X	X					X		X	X
GROUNDSKEEPER	X	X	X	X	X	X	X			X	X	X		X	X
HEALTH CLERK	X	X	X	X	X	X	X	X	X	X	X	X		X	X
HOUSEKEEPER	X	X	X	X	X	X	X			X	X	X		X	X
LASER PROBE OPERATOR	X	X	X	X	X	X	X					X		X	X
LAUNDRY WORKER	X	X	X	X	X	X	X					X		X	X
MACHINIST/ TOOL MAKER	X	X	X	X	X	X	X					X		X	X
MAINTENENCE WORKER	X	X	X	X	X	X	X	X	X	X	X		X	X	X

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PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S WRITING CURRICULUM MATRIX

OCCUPATIONS / COMPETENCIES	SENTENCE STRUCTURE	PARTS OF SPEECH	PHRASES & CLAUSES	PARALLEL CONSTRUCTION	PUNCTUATION	CAPITALIZATION	PROOFREADING/ EDITING	NARRATIVE WRITING	PERSUASIVE WRITING	DESCRIPTIVE WRITING	EXPOSITORY WRITING	INCIDENT REPORT WRITING	BUSINESS LETTER WRITING	MEMO WRITING	SPELLING
MANUFACTURING TECHNICIAN	X	X	X	X	X	X	X					X		X	X
NURSES' AIDE	X	X	X	X	X	X	X	X		X	X	X		X	X
OPERATIONS COORDINATOR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PAINTER	X	X	X	X	X	X	X					X		X	X
PLUMBER	X	X	X	X	X	X	X					X		X	X
RECEPTIONIST	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
REHABILITATION TECH.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
RESIDENTIAL SUPERVISOR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT'S WRITING CURRICULUM MATRIX

OCCUPATIONS / COMPETENCIES	SENTENCE STRUCTURE	PARTS OF SPEECH	PHRASES & CLAUSES	PARALLEL CONSTRUCTION	PUNCTUATION	CAPITALIZATION	PROOFREADING/ EDITING	NARRATIVE WRITING	PERSUASIVE WRITING	DESCRIPTIVE WRITING	EXPOSITORY WRITING	INCIDENT REPORT WRITING	BUSINESS LETTER WRITING	MEMO WRITING	SPELLING
SALES/MARKETING	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SECRETARY CLERK TYPIST	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SHIPPING CLERK/ SUPERVISOR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TOOL AND DIE OPERATOR	X	X	X	X	X	X	X	X			X	X	X		X

A30

The first seven areas were viewed as basic skills necessary for literacy in writing.

Sample Company-Specific Curriculums and Lessons

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT
ESOL CURRICULUM
AIRESEARCH

Week

1. Pretest, needs assessment.
   Identify self and co-workers; introduce self: give and ask for name, address, phone number, job title, department, employer, marital status.

2. Describe a procedure; list and ask questions about tasks involved in a process in the correct order.

3. Look up and explain specifications for a procedure; ask for help to complete a task; describe a problem in the process; verify, clarify a procedure.

4. Write a short note describing an unfinished task; read and explain instructions from prior shift regarding an unfinished task.

5. Understand and explain the company attendance policy.

6. Understand and explain the company vacation and sick leave policy.

7. Understand and explain company clothing requirements and safety regulations.

8. Read and explain hazardous warning labels; describe dangers of hazardous materials used at work.

9. Understand and explain company benefits; ask about changes in pay, policies, benefits.

10. Report an accident.
    Post test and course evaluation.

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT
AIRESEARCH ESOL

Week 2, Third Class Period

Lesson - **Describe a procedure**

Materials - White board, rods, Double Action picture of toy factory.

Lesson procedure

1. Show poster and elicit statements, i.e.
   a. He is putting on the wheels;
   b. She is painting the toy car.
   c. He is stamping out the car body.

Leading to

2. The following transformations:
   a. He attaches the wheels;
   b. She paints the toy car;
   c. He stamps out the car body;

And thus

3. Her job is to....

4. Describe the process in toy factory in order:
   a. First one person...
   b. Then somebody...
   c. Then somebody...
   d. Next, someone...
   e. Finally, someone...

Leading to

5. At AiResearch,
   a. First someone presses and labels the boards;
   b. Then Bich...
   c. etc.

MATH FUNDAMENTALS CURRICULUM
BURR-BROWN

Week One: Pre-Assessment
Whole Numbers
- Place Value
- Addition Computations/Applications
- Subtraction Computations/Applications
- Multiplication Computations/Applications
- Division Computations/Applications

Week Two: Figuring Averages
Graphing
- Average
- Range
- Charting information

Week Three: SPC Graphing

Week Four: Fractions
- Introduction to Fractions
- Addition of Fractions Computations/Applications
- Subtraction of Fractions Computations/Applications

Week Five: Fraction's
- Multiplications of Fractions Computations/Applications
- Division of Fractions Computations/Applications

Week Six: Introduction to Decimals
- Reading Decimals
- Writing Decimals
- Comparing Decimals
- Addition of Decimals Computations/Applications
- Subtraction of Decimals Computation/Applications
- Multiplication of Decimals Computations/Applications
- Division of Decimals Computations/Applications

Week Seven: Introduction to Percents
Finding a Percent of a Number
Finding Percent Applications
Finding a number when a percent is given
Determining Percent Increase
Determining Percent Decrease
Using Percents: The Percent Circle

Week Eight: Math Integrations
Changing Fractions to Decimals
Changing Fractions to Percents
Changing Decimals to Fractions
Changing Decimals to Percents
Changing Percents to Decimals
Changing Percents to Fractions
Decimal Percents
Fractional Percents

Week Nine: Using Approximation in Problem Solving
Using Approximation in Word Problems
English Measurement
Metric Measurement

Week Ten: Post-Assessment
Evaluations

BURR-BROWN®

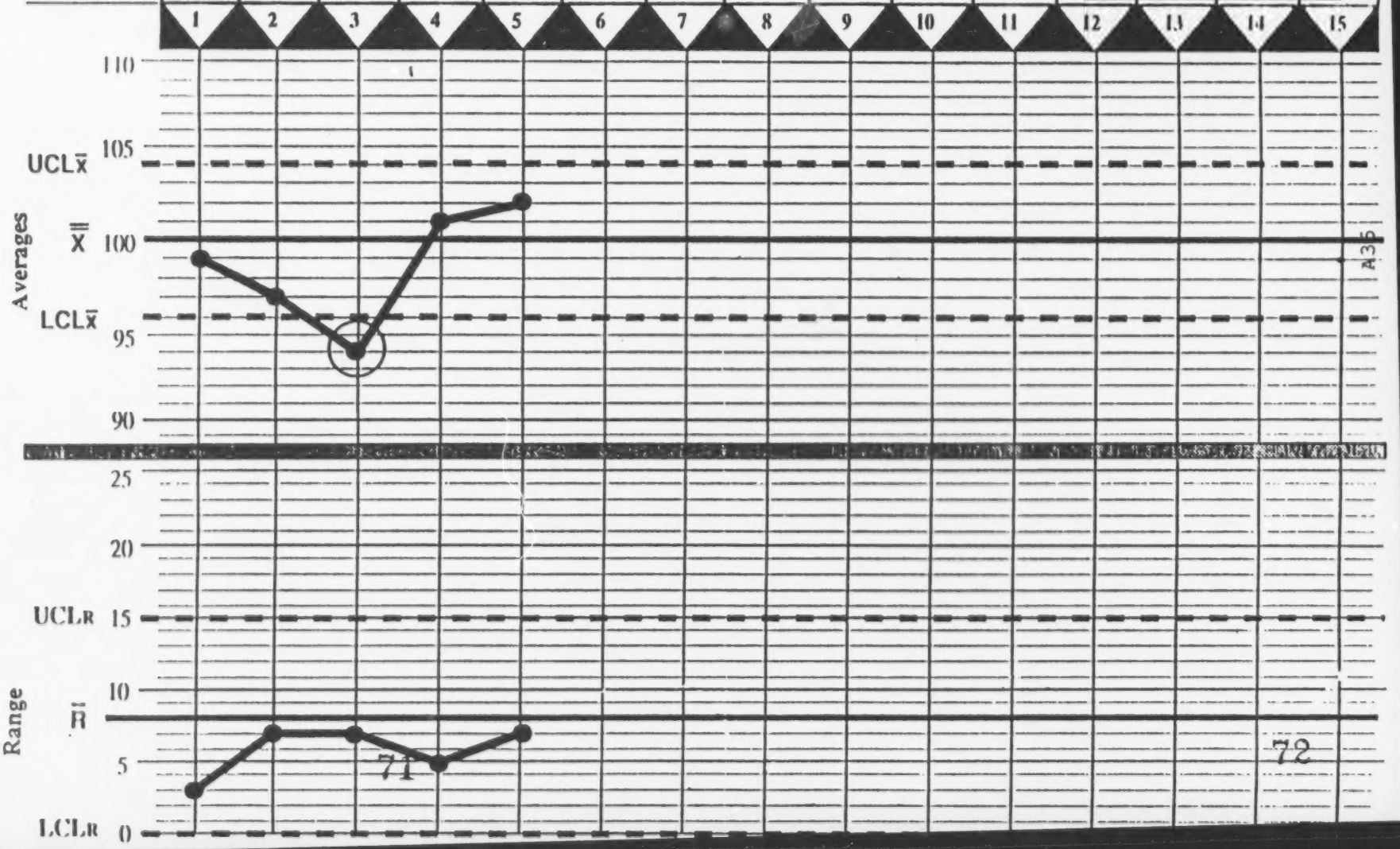
SPC Work Sheet Average and Range
Sheet # 1

Round answer to nearest whole number

Sample	Average (X)	Range (R)
1,2,3	----------	---------
14,25,16,37,28,10	----------	---------
96,97,97,92	----------	---------
27,222,138,100,90 35,182,122,134,81, 100	----------	---------
1.07, 1.03,1.09, 0.93, 1.05	----------	---------
5.23, 25.17, 15.37, 30.2	----------	---------
98.035, 100.07, 87.307	----------	---------
66.5, 41.2, 32.1, 29.5	----------	---------

BURR-BROWN®

Sample	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	98	100	98	99	107	95	101	100	107	94	98	97	100	99	104
2	100	96	93	100	100	92	97	103	107	98	99	100	105	98	101
3	97	93	94	100	100	102	97	99	109	97	90	104	106	101	97
4	99	99	94	100	105	92	101	98	93	93	98	100	101	96	93
5	100	97	91	104	100	94	90	101	105	94	101	106	103	102	100
Sum	494	485	470	503	512										
Average	99	97	94	101	102										
Range	3	7	7	5	7										



Sample Pre- and Post-Assessments

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT
ESOL ORAL PRE-TEST FOR MANUFACTURING WORKSITES

1. When 2 people want to take vacation at the same time but the company says only one person can go, what happens?

2. If you quit, does the company have to pay you for accrued vacation time?

3. What are 2 things that must be worn by manufacturing personnel?

4. What's an example of a hazardous chemical?

5. Who is responsible for writing your performance review? or

   How often do you have a performance review?
   Why? What's the purpose?

6. What are 3 tools you use at work?

7. What is one thing you like about you job?

8. What is one thing you <u>don't</u> like about it?

ESOL LISTENING PRE-TEST

1. Fold the paper in quarters to mark the center, then unfold it.

2. Fold all the corners into the middle.

3. Turn it over and fold all the corners into the center again.

4. Fold it in half.

5. Pinch the top outside corners and bring them together

6. Hold it with the fingers of one hand.

7. Open the "wings" and put your thumb and three fingers in the pockets.

8. Open and close your package in two directions.

ESOL WRITING PRE-TEST

A. Write a paragraph describing how you would change your situation at Burr-Brown to make it the perfect place to work. You can change anything you want. The only requirement is that you must complete a certain amount of quality work every week. What would you change? What hours would you work? How would you arrange the work day? How would you arrange the work situations? Be serious about your answer and write your paragraph in a thoughtful, logical manner including as many details as possible.

ESOL READING PRE-TEST

I. Please read the paragraphs below and choose the ending that best completes each sentence.

5.1.3 Sequence For Putting On/Taking Off Clothing

If full "bunny suit" protection is specified, as for class 100 rooms, snap one side of the face mask into the hood, place the hood over the head ensuring that the hair is fully covered, snap the other side of the face mask to cover the mouth and nose (and beard and mustache) and snap the hood around the neck. Next, put on the coveralls and tuck the hood inside. Finally, put on the bootees followed by the gloves. Reverse this order for removing the bunny suit.

In all other cases, put on the hair cover first, including the cover for the beard if worn. Next comes the face mask to cover nose, mouth and mustache if worn. Then put on the body cover, smock or coveralls followed by the bootees, if specified. Finally, put on the gloves and/or finger cots. Remove this clothing in the reverse order.

A. This paragraph tells
   1. the purpose for putting on special clothing
   2. the order for putting on special clothing
   3. the names of the various pieces of clothing

B. According to the instructions
   1. You should put on the bootees before you put on the smock.
   2. You should put on the bootees and smock at the same time.
   3. You only have to wear bootees if you wear a smock.
   4. You should put on the smock before you put on the bootees.

C. To take off the bunny suit,
   1. first take off the gloves.
   2. take off the coveralls last.
   3. tuck the hood inside.

D. In class 100 rooms
   1. You put on your clothes in a different order
   2. You must wear a bunny suit
   3. You must reverse the order of putting on the bunny suit.

II. Read this section of the Employees' Handbook and choose the number which best completes each sentence.

540's--The Open Door Policy/Direct Lines:

540-- The "Open Door Policy" is two things. On one level, it is the informal approach we take to the general process of communications at Burr-brown: employees are encouraged to pursue answers to any questions they may have about the company and their jobs. On another level, it is a formal procedure and program which is designed to assure that employees will be able to communicate their suggestions, complaints, and concerns at and to all levels of management. In an organization our size, it is inevitable that employees will occasionally have problems or complaints. We encourage employees to use the following sequence and procedure when pursuing these issues:

1) **Immediate manager:** The first step in getting information about your job, wages, safety, or any corporate issue should be to talk to your manager. This relationship is perhaps the most important communication channel in the company; seek to keep it open and honest. A manager is required to respond to your request within five (5) days.
2) **Human Relations Section Manager:** Occasionally, a questions or problem may arise which cannot be resolved at the employee/manager level. If this occurs, the next step is for either the employee or the manager to seek the help of the appropriate Human Relations Section Manager. The Section Manager takes the responsibility for responding to the issue, including doing the necessary research through all available records and files. Having done this, the Section Manager will then schedule a meeting for the employee with upper levels of management to present the issue. This step should also be done within five days.
3) **Human Relations Council:** If the issue is still not resolved, the employee or manager man request a meeting of the Human Relations Council to discuss the problem. The employee should at this point prepare a brief, written description of the case for the Council's review. The Council has ten (10) working days to provide a response to the employee.
4) **The President:** If the parties concerned are not satisfied that the issue has been resolved at this point, they may request that the President review the case.

A. In the "Open Door Policy," whose door is open?
   1. Burr Brown's
   2. the employees'
   3. all managers'

B. The "Open Door Policy" means
   1. You can talk to the president anytime you have a problem at work.
   2. Your manager must talk to you anytime, even if she/he is very busy.
   3. You can talk to your manager about any work-related issue.

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT
ESOL POST TEST
AIRESEARCH

Name_____

READING/WRITING

I. Look at the answers in this discussion between two workers at AiResearch. What are the questions?

A. I understand you're new here.

Where *did you work before?*

B. I worked at Tritronics.

A. Really? How long_____?

B. Three years.

A. And why _____?

B. I wanted to stay home with my new baby.

A. Oh, really? When_____?

B. Six months ago.

A. Do you have any pictures?

II. Look at these answers. Then write indirect questions. Be very polite.

A. *Could you tell me where the conference room is?*

The conference room is next to the President's office.

B._____

If you are going to be late for work, you should call your supervisor.

C._____

Yes, you have to wear a smock.

D._____

Margaret is my supervisor.

E._____

The day shift ends at 3:30

III. Please answer these questions.

A. Which do you think is more difficult, pick & place or pin attach?

B. Do you think higher pay is more important than better benefits?

C. Which do you think is more relaxing, working day shift or working swing shift?

D. Which do you think is more important to the company, quality or quantity?

E. Do you think working with hazardous chemicals is more dangerous than working with big machinery?

SPEAKING/LISTENING (ORAL)

I. Please say two things about any two of these people. Use the present tense.

A. Larry MacDonald

B. Michael Nguyen

C. Margaret Ramirez

D. Michael McDonald

E. One of your co-workers

II. Please answer these questions about AiResearch.

A. Could you tell me what time your shift starts?

B. Do you know how many employees AiResearch has?

C. Do you know where the hazardous chemicals are stored?

D. Could you please tell me how many hours of vacation time you earn every year?

E. Do you know where the lunch room is?

III. Please answer these questions.

A. How often have you come to work late this year?

B. Have you ever worked for another electronics company?

C. Have you ever hurt yourself on the job?

D. How many different jobs have you learned at AiResearch?

E. How often has your supervisor criticized you during the last year?

F. How many hours of vacation have you earned?

NAME _____

DATE _____

MATH FUNDAMENTALS PRE-TEST
BURR-BROWN

Find the value of each digit shown below.

1. 8 in 983 _____ 2. 7 in 170,349 _____

Write each of the following as a whole number.

3. two thousand, ninety _____

4. forty thousand, nine hundred twenty _____

Add the following.

5. $\begin{array}{r} 309 \\ +\ 50 \\ \hline \end{array}$ 6. $\begin{array}{r} 852 \\ +\ 36 \\ \hline \end{array}$ 7. $\begin{array}{r} 4{,}821 \\ 475 \\ 3{,}724 \\ +\ 744 \\ \hline \end{array}$

8. Jil's phone bill for April listed $9.18 for monthly service, $14.19 for long distance calls and $1.82 for taxes. How much was her total bill?

9. In one month the Jacksons paid $525 for rent, $25.19 for the telephone, $34.18 for utilities and $126.48 for a car payment. Find the total of these monthly bills.

Subtract the following.

10. $\begin{array}{r} 86 \\ -\ 23 \\ \hline \end{array}$ 11. $\begin{array}{r} 9{,}358 \\ -\ 244 \\ \hline \end{array}$

12. Jeff bought a new shirt for $18.27. He gave the clerk a $20 bill. How much change did he get?

13. A stereo system once sold for $630. It was on sale for $569. How much can you save buying the stereo on sale?

Multiply the following.

14. 53 x 8

15. 240 x 12

16. 2,964 x 803

17. Cecilia can type 82 words a minute. How many words can she type in 13 minutes?

18. On the scale of a roadmap one inch equals 25 miles. How far apart are two cities which are 7 inches apart on the map?

Divide the following.

19. 432 ÷ 9 = _____

20. 2,590 ÷ 37 = _____

21. One dozen oranges costs $1.19. How much does one orange cost?

22. Frank is a carpenter. He plans to build five bookcases. He paid $289.50 for lumber, $12.83 for screws, and $24.85 for varnish. What is the cost of materials for one bookcase?

Reduce the following.

23. 9/45 = _____

24. 20/32 = _____

25. 25/45 = _____

Add the following.

26. 3/7 + 2/7

27. 1/6 + 1/6

28. 7 1/6 + 8 5/6

29. 5/8 + 1/4

30. 5/12 + 1/3

31. 7 9/10 + 3 4/15

32. 6 3/8 + 4 2/8

33. The porch behind Clark's house was 5 1/2 feet wide. Clark built a 6 7/12 foot wide extension on the porch. How wide was the new porch?

34. Andy is 71 3/8 inches tall. His brother Fred is 1 1/8 inches taller. How tall is Fred?

Subtract the following.

35. 6/7 - 4/7 = _____

36. 8/9 - 5/9 = _____

37. $6\ 13/18 - 3\ 7/18$

38. $1\ 1/8 - 7/8$

39. $9 - 5\ 5/7$

40. $14\ 9/24 - 3\ 3/12$

41. Joe bought a piece of lumber 95 1/2 inches long. He sawed off a piece that was 37 1/2 inches long. How long is the original board?

Multiply the following.

42. $2/5 \times 2/3 =$ _____

43. $4/9 \times 1/2 =$ _____

44. $3/8 \times 4/9 =$ _____

45. $7/12 \times 10 =$ _____

46. $3\ 1/5 \times 5/12 =$ _____

47. $4\ 2/9 \times 6\ 3/4 =$ _____

48. Joe's weekly salary is $282. His employer takes our 1/6 of Joe's salary for taxes and Social Security. How much does Joe's employer take out of Joe's check?

Divide the following.

49. $9/10 \div 3/4 =$ _____

50. $9/16 \div 3/20 =$ _____

51. $6 \div 3/4 =$ _____

52. $3\ 1/2 \div 3/4 =$ _____

53. Harriet paid $4.05 for 2 1/4 pounds of ground beef. Find the cost of one pound of beef.

Write these decimals in words.

54. .5 = _____

55. .07 = _____

56. .0029 = _____

57. 9.12 = _____

Write each number as a decimal.

58. nine tenths _____

59. twenty-two thousandths_____

Circle the bigger decimal in each group.

60. .092 or .9

61. .04 or .052

62. .304 or .04

Change each fraction to a decimal.

63. 4/5 = _____ 64. 2/7 = _____

Change each decimal to a fraction.

65. .05 = _____ 66. .048 = _____

Add the following.

67. .28 + .3 + .708 = _____ 68. 2.1 + 66 + 3.97 + _____

69. The average April temperature in Chicago is 47.8. The average April temperature in St. Louis is 8.3 higher. Find the average April temperature for St. Louis.

Subtract the following.

70. .07 - .052 = _____ 71. 4 - .058 = _____

72. The area of the United States is about 3.3 million square miles. The area of Canada is about 3.8 million square miles. How much bigger is Canada in area?

Multiply the following.

73. 2.4 x 2.5 = _____ 74. 8 x .03 = _____

75. Mike worked overtime for $8.60 an hour. Last week he worked 7.5 hours overtime. How much did he make in overtime?

Divide the following.

76. .902 ÷ 18 = _____ 77. 3.12 ÷ 6 = _____

78. 22.8 ÷ .4 = _____ 79. 148.5 ÷ 4.5 = _____

80. John works 35 hours per week. He makes $ 262.89 before taxes. How much does John make per hour?

Change each decimal to a percent.

81. .6 = _____ 82. .248 = _____ 83. .03 1/3 = _____

Change each fraction to a percent.

84. 3/10 = _____ 85. 3/25 = _____ 86. 1/8 = _____

Find the following.

87. 15% of 140 = _____ 88. 90% of 60 = _____

89. 25% of what number is 35? _____

90. Sophie got a raise of 12%. Her raise amounts to $22.50 per week. How much was she making before her raise?

91. Usually there are 25 people at the meetings of the Eleventh Street Tenants' Organization. At the last meeting there were only 16 people. What percent of the usual number was absent?

92. Last year Sue paid $840 in federal income tax. This year she will pay $980. By what percent did her income tax increase?

93. 25% of what number is 12? _____

94. 60% of what number is 90? _____

95. 87.5% of what number is 35? _____

96. 83 1/3% of what number is 75? _____

97. Jeff works on a commission rate. He gets 5% of the value of the clothes he sells. Last week he made $125.30 in commissions. What was the value of the clothes he sold?

Write your answers as signed numbers.

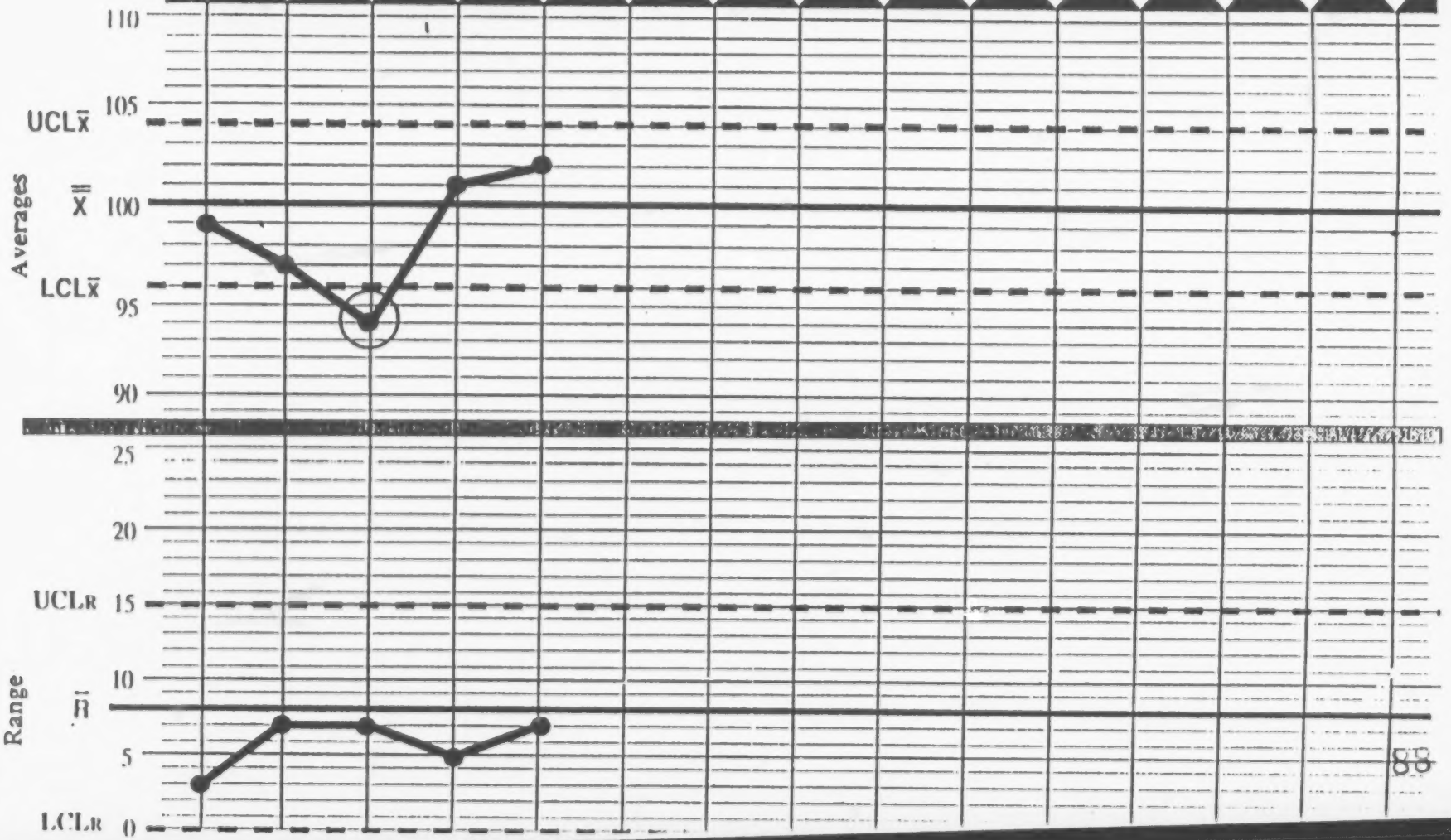
98. (-12) + (+6) = _____ 99. (-15) + (+15) = _____

100. (+8) + (-2) = _____

BORE KNOWN

BB

Sample	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	98	100	98	99	107	95	101	100	107	94	98	97	100	99	104
2	100	96	93	100	100	92	97	103	107	98	99	100	105	98	101
3	97	93	94	100	100	102	97	99	109	97	90	104	106	101	97
4	99	99	94	100	105	92	101	98	93	93	98	100	101	96	93
5	100	97	91	104	100	94	90	101	105	94	101	106	103	102	100
Sum	494	485	470	503	512										
Average	99	97	94	101	102										
Range	3	7	7	5	7										



A50

87

88

Name_____

Date_____

MATH FUNDAMENTALS POST-TEST
BURR BROWN

FIND THE VALUE OF EACH DIGIT SHOWN BELOW.

1. 9 in 709 _____ 2. 8 in 186,930 _____

WRITE EACH NUMBER AS A WHOLE NUMBER.

3. Five thousand, ninety-four _____

4. Fifty thousand, seven hundred and ten _____

ADD THE FOLLOWING:

5. $\begin{array}{r} 412 \\ +\ 67 \\ \hline \end{array}$

6. $\begin{array}{r} 967 \\ 56 \\ +\ 12 \\ \hline \end{array}$

7. $\begin{array}{r} 7{,}894 \\ 12{,}854 \\ 35{,}841 \\ +\ 6{,}921 \\ \hline \end{array}$

8. $\begin{array}{r} 7{,}980 \\ 987 \\ 1{,}212 \\ +\ 2{,}781 \\ \hline \end{array}$

9. Tony was recently hired at Hane's Manufacturing. His first week on the job he took home $118.29, the second week, $197.13, and the third week, $113.29. How much was his take home pay for three weeks?

SUBTRACT THE FOLLOWING.

10. $\begin{array}{r} 243 \\ -\ 12 \\ \hline \end{array}$

11. $\begin{array}{r} 3{,}351 \\ -\ 2{,}775 \\ \hline \end{array}$

12. $\begin{array}{r} 60{,}050 \\ -\ 16{,}987 \\ \hline \end{array}$

13. Five hundred and seventy-two peoplework at the Benning Corporation. Forty-nine people have been laid off. How many people now work at the Benning Corporation?

14. The Bennetts need $35,000 as a down payment on a new house. So far they have $23,117. How much more money do they need?

MULTIPLY THE FOLLOWING.

15. 673 x 40

16. 3,891 x 612

17. There are three feet in one yard. How many feet are there in 72 yards?

18. On the scale of a roadmap one inch equals 25 miles. How far apart are two cities which are 9 inches apart on the map?

DIVIDE THE FOLLOWING.

19. 4,656 ÷ 8

20. 1,115 ÷ 23

21. George is a traveling salesman. In the last ten days he has driven 3,560 miles. What is the average distance he drove each day?

22. Three hundred and forty-eight people live in the village of Millerton. The total income last year for everyone in Millerton was $1,754,964. What was the average income per person in Millerton?

FRACTIONS

Reduce the following.

23. 8/72 = _____ 24. 9/45 = _____ 25. 20/34 = _____

Change the following to mixed fractions or whole numbers.

26. 78/34 = _____ 27. 13/2 = _____ 28. 50/10 = _____

Add the following.

29. 5/8 + 2/8 = _____ 30. 1/2 + 3/4 = _____

31. $\begin{array}{r} 1\ 1/3 \\ +\ 3\ 3/8 \\ \hline \end{array}$

32. $\begin{array}{r} 7\ 7/9 \\ +\ 4\ 4/9 \\ \hline \end{array}$

33. $\begin{array}{r} 10\ 1/5 \\ +\ 6\ 8/9 \\ \hline \end{array}$

34. Jason jogs every morning before he goes to work. Last week he jogged the following distances: Monday, 2 1/2 miles; Tuesday, 3 3/7 miles; Wednesday, 2 3/10 miles; Thursday, 1 7/10 miles; Friday, 3 miles. How many miles did Jason jog altogether last week?

Subtract the following.

35. 7/10 - 3/10 = _____

36. 5 3/8 - 3 5/8 = _____

37. $\begin{array}{r} 7 \\ -\ 5\ 1/2 \\ \hline \end{array}$

38. $\begin{array}{r} 15 \\ -\ 8\ 2/3 \\ \hline \end{array}$

39. $\begin{array}{r} 10 \\ -\ 2\ 1/6 \\ \hline \end{array}$

40. $\begin{array}{r} 15\ 3/8 \\ -\ 7\ 9/10 \\ \hline \end{array}$

41. Jim weighed 208 pounds. He went on a diet and lost 46 1/2 pounds. How much did Jim weigh after his diet?

42. Rachel's normal temperature is 98 6/10. When she was sick with the flu her temperature went up to 104 3/10. How much did her temperature go up?

Multiply the following.

43. 4/9 x 1/2 = _____

44. 2/3 x 5/6 x 4/9 = _____

45. 3/8 x 4/9 = _____

46. 5/24 x 18/25 = _____

47. 7/12 x 10 = _____

48. 15 x 7/10 = _____

49. 4 2/9 x 6 3/4 = _____

50. 1 1/3 x 4 1/2 = _____

51. On Monday there were 480 boxes in the warehouse where Bill works. He shipped 7/10 boxes by air freight. How many boxes are left?

52. Lumber sells for $3.80 a foot. How much will Max have to pay for 14 1/2 feet of lumber?

53. Celeste makes $6.50 an hour. How much does she make on a day when she works 7 1/2 hours?

Divide the following.

54. 3/4 ÷ 6/7 = _____ 55. 6/35 ÷ 21/50 = _____

56. 12 ÷ 8/9 = _____ 57. 15 ÷ 3/4 = _____

58. 24 ÷ 3/5 = _____ 59. 4 4/5 ÷ 2/5 = _____

60. 4 1/4 ÷ 3 3/4 = _____ 61. 7 1/2 ÷ 5 = _____

62. Pete is splitting a board that is 24 inches wide. How many 3/4 inch-wide strips can he get from the big board?

63. Joe needs 4 1/2 feet of lumber to build a small bookcase. How many bookcases can he build with 24 feet of lumber?

DECIMALS

Write these decimals in words.

64. .8 = _____ 65. .09 = _____ 66. .002 = _____

Write each number as a decimal.

67. Five tenths = _____

68. twenty-five thousandths = _____

Circle the bigger decimal in each group.

69. .081 or .08 70. .059 or .0499 71. .608 or .68

Write each fraction as a decimal.

72. 6/10 = _____ 73. 18 3/100 = _____

Change each decimal to a fraction.

74. .089 = _____ 75. .08 = _____

Add the following.

76. .28 + .76 = _____ 77. .109 + 9.12 = _____

78. Jill swam .7 of a mile on Wednesday and 1.9 of a mile of Thursday. How many miles did Jill swim on Wednesday and Thursday?

Subtract the following.

79. .09 - .07 = _____ 80. 5 - .09 = _____

81. Lou had a piece of property that was 6.7 acres. He sold 2.5 acres. How much land does Lou have left?

Multiply the following.

82. 5.8 x 6.7 = _____ 83. 7.9 x4.5 = _____

84. 1.01 x 2.3 = _____ 85. 3.6 x 3.334 = _____

86. Candy types 72 word a minute. How many words can she type in 10.5 minutes?

Divide the following.

87. .87 ÷ .2 = _____ 88. 9.13 ÷ 12.3 = _____

89. 22.9 ÷ .3 = _____ 90. 148.5 ÷ 12 = _____

91. Sue worked 35 hours last week. Her gross pay was 415.38 dollars. How much does Sue make an hour?

92. Jim has a piece of lumber that is 9.8 feet long. Jim wants to cut it into 5 equal pieces. How long will each piece be?

PERCENTS

Change each decimal to a percent.

93. .9 = _____ 94. 5.60 = _____

Change each fraction to a percent.

95. 5/10 = _____ 96. 5/8 = _____

Find the following.

97. 12% of 113 = _____ 98. 15% of 35 = _____

99. 47% of 112 = _____ 100. 89% of 17 = _____

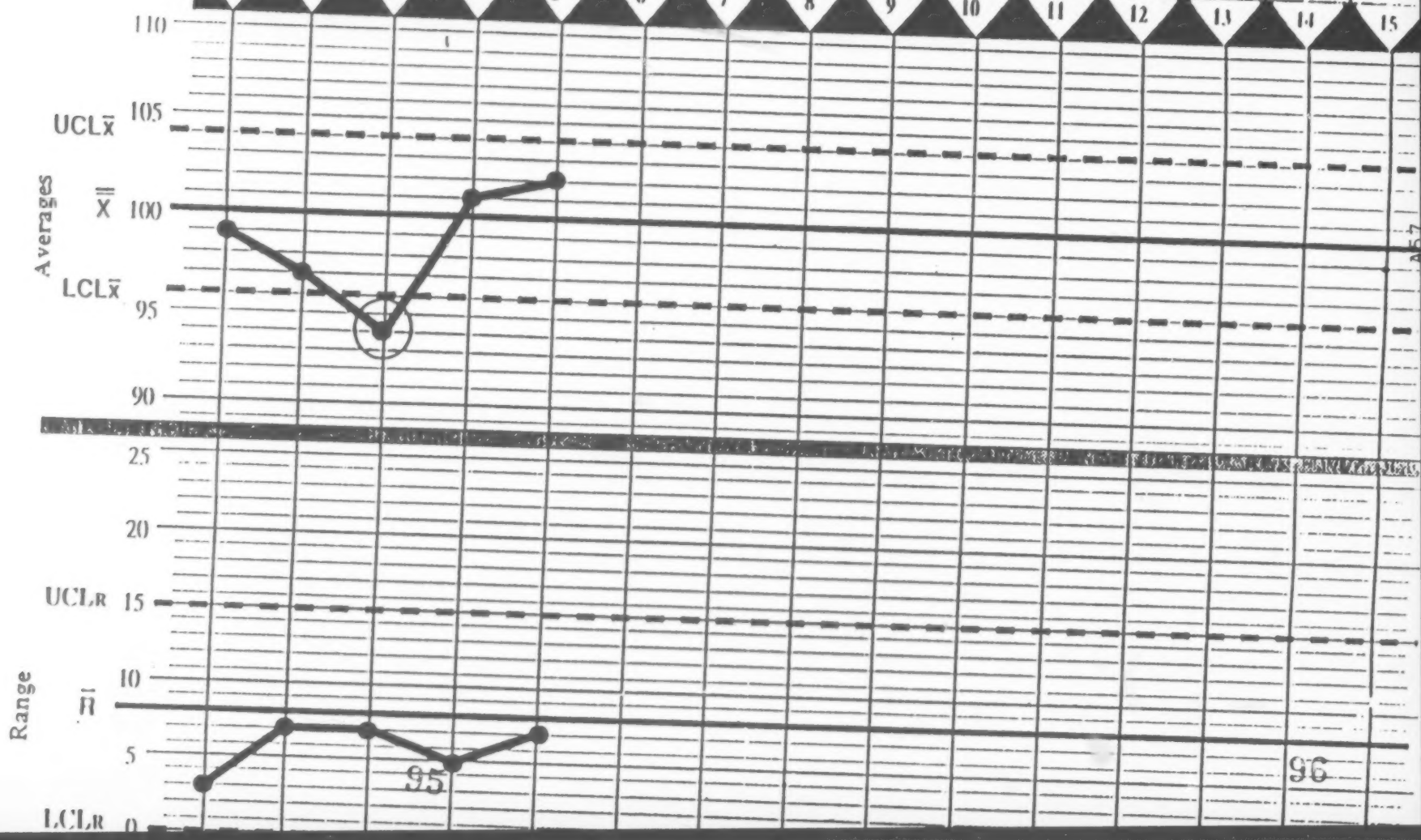
101. 45% of what number is 29? _____

102. 53% of what number is 25? _____

103. 39 % of what number is 115? _____

104. On a recent test Chris missed 33 out of 89 problems. What percent did Chris get wrong?

Sample	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	98	100	98	99	107	95	101	100	107	94	98	97	100	99	104
2	100	96	93	100	100	92	97	103	107	98	99	100	105	98	101
3	97	93	94	100	100	102	97	99	109	97	90	104	106	101	97
4	99	99	94	100	105	92	101	98	93	93	98	100	101	96	93
5	100	97	91	104	100	94	90	101	105	94	101	106	103	102	100
Sum	494	485	470	503	512										
Average	99	97	94	101	102										
Range	3	7	7	5	7										

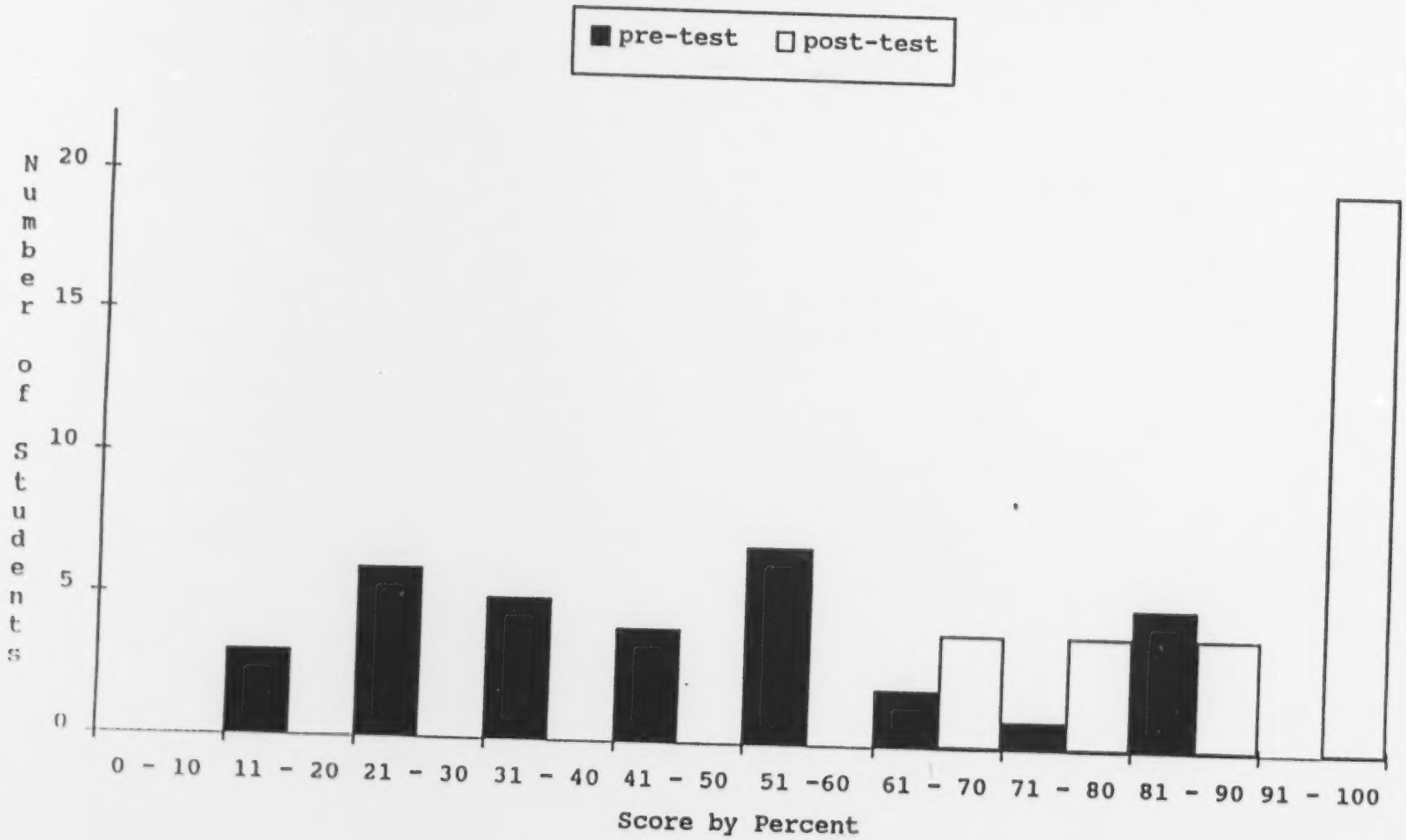


Sample Pre-Post Test Comparisons: Basic Math

BURR-BROWN®

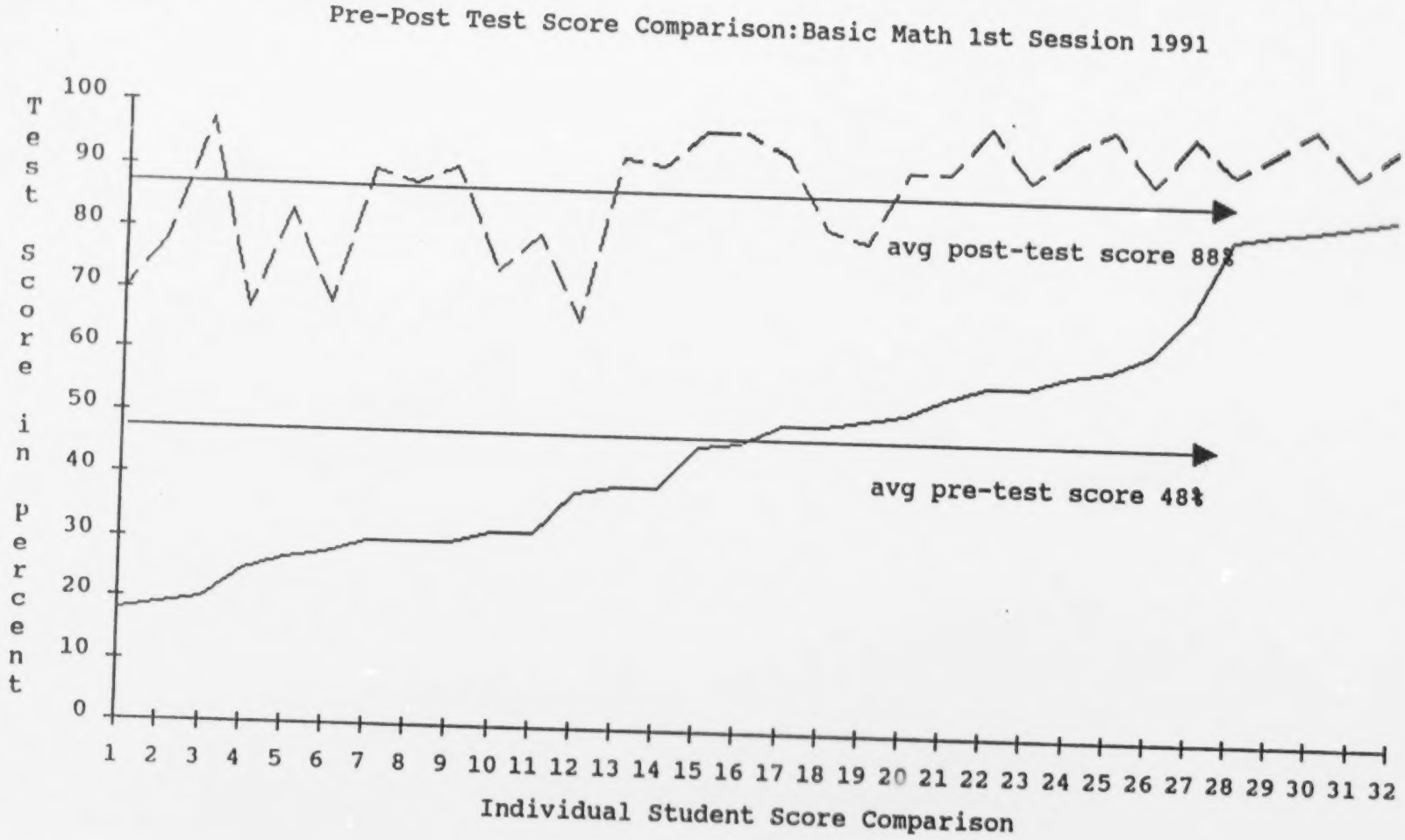
BB

Pre-Post Test Score Comparison:Basic Math 1st Session 1991



A58

BURR-BROWN®



A59

Holistic Scoring Guidelines for Writing Sample

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT
HOLISTIC SCORING GUIDELINES FOR WRITING SAMPLES

Criteria	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1
Purpose	Demonstrates clear and definite understanding of purpose. Clearcut understanding of scope and sequence.	Demonstrates acceptable understanding of the purpose, scope and sequence.	Demonstrates some understanding of the purpose.	Demonstrates some understanding of purpose, but may include digressions.	Demonstrates little understanding of the purpose.	Purpose not evident.
Content	Content includes highly substantive ideas uses supportive material that is relevant and specific.	Content includes clearly stated, relevant ideas with supporting information.	Content includes sufficient appropriate ideas with some supporting information.	Content is limited to simple testing or haphazard recitation of ideas.	Superficial or inappropriate content.	Content is deficient.
Organization	Develops logical, coherent organization appropriate for specific style of business writing: Requests before justifications, Answers before explanations, Conclusions before discussions, Summaries before details, Generalities before specifics.	Develops logical, coherent organization appropriate for business writing.	Develops an adequate organizational plan appropriate for business writing.	Demonstrates a limited or insufficient plan of organization.	Little or no plan of organization . Support material is inadequate or unsupported.	Organization is not evident.
Format	Demonstrates correct use of business writing formats: memo, letter, report, proposal, accident and incident report, performance review.	Demonstrates appropriate use of business writing formats: memo, letter, report, proposal, accident and incident report, performance review.	Adequate use of business writing formats.	Limited use of business writing formats.	Format is unclear.	Format is not evident.
Language	Uses specific, precise language, emphasizes the active voice.	Uses appropriate language but less precise or specific. Active voice is evident.	Uses acceptable language, frequently uses passive writing style.	Uses ordinary, imprecise language usually written in the passive writing style.	Uses immature or inappropriate language.	Language fails to communicate.
Conventions of Standard Written English (CSWE)	Uses CSWE with few or no errors in mechanics. Utilizes Westroots Rules of Writing.	Demonstrates controlled use of CSWE with occasional errors in mechanics. May utilize Westroots Rules of Writing.	Use of CSWE is generally reliable and errors in mechanics do not interfere with communication.	Repeated weakness in the CSWE which interferes with communication.	Serious errors in CSWE interfere with communication.	Does not use CSWE.

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Sample Student Needs Assessment

U. of A. English Course
Advanced
NEEDS ASSESSMENT
February 3, 1992

Name:_____

Here is your chance to tell us what you need to work on in English. The more precise you can be in your answers, the better. This is your class. We need your ideas to help us plan for this English course. As you fill out this form, please feel free to ask me questions.

I. What skill needs the most work? Please number the skills in order of importance for you.

Understanding spoken English (Listening comprehension) ___

Speaking English ___

Reading English ___

Writing English ___

II. SPOKEN ENGLISH

A. I need to improve

pronunciation	___	(Please number on a
grammar	___	scale of 1-5 any
vocabulary	___	items you'd like to
fluency	___	work on in this
understanding	___	class.)

COMMENT:_____

_____

B. I have trouble understanding/expressing myself in these situations:

1. _____

2. _____

3. _____

C. I enjoy talking about these topics:

1.

2.

3.

III. READING

A. Do you like to read in your native language? What do you read?

_____

_____

B. Do you read in English? If so, what do you read?

_____

C. What subjects would you like most to read about?

1.

2.

3.

D. Is there any job-related reading that you would like to work on?

1.

2.

3.

IV. WRITING

A. I am especially interested in writing

letters _____

reports _____

stories _____

others:_____ _____

B. Is there any job-related writing that you would like to work on?

1.

2.

3.

COMMENT:_____

_____

Please write about what you hope to learn in this English course, considering that the total time for the course will be 40 to 48 hours. What specifically would you like to be able to do better in English at the end of the course that you are having trouble with now?

Sample Supervisor Needs Assessment

Pima County Adult Education
Workplace Education Project
ESOL Needs Assessment
Supervisors/Managers

1. Are there any people on the attached list of limited English speakers who...

___ a. don't understand the concept of evaluation?

___ b. cannot read their evaluation?

___ c. need help understanding their evaluation?

___ d. are difficult to train because their English is so lacking?

___ e. need a translator in order to be trained?

___ f. don't understand the training materials?

___ g. don't understand the deductions taken from their paycheck.

___ h. don't understand their benefits?

___ i. bring someone to translate when they think errors may have been made on their paycheck?

___ j. don't understand explanations given by payroll personnel concerning their paycheck

___ k. make mistakes in their work because they don't understand the directions?

___ l. hide their mistakes because they don't want anyone to know they've made them?

___ m. you hate to tell they've made a mistake because of how they'll react?

___ n. say they understand but you're not sure they do?

___ o. you can't understand when they ask for a tool or supplies?

___ p. don't know the names of tools they use or the supplies they need?

___ q. can't read or understand the employee handbook?

___ r. don't follow work rules regarding clothing, eating, behavior, etc?

___ s. misunderstand or don't know how benefits are computed?

___ t. have had or have caused an accident or injury?

___ u. couldn't write a description of an accident or injury?

___ v. couldn't explain how an accident or injury occurred?

___ w. don't always follow or understand safe work practices?

___ x. don't call in well ahead of time when they are sick?

___ y. take sick time when they shouldn't?

___ z. don't understand the parameters of sick time?

___ aa. can't explain how much of a job they have completed?

___ bb. have trouble explaining what they have done compared to what someone else has done?

2. Which of these skills do you think are the most important for success at work? Check all that apply. Star the most important.

___ oral communication (grammar, word order, vocabulary)

___ pronunciation

___ listening comprehension

___ reading

___ writing

3. Why do employees need to speak and understand English where you work? Check all that apply. Star the most important.

___ to follow oral instructions

___ to give oral instructions

___ to communicate with supervisors

___ to communicate with co-workers

___ to ask questions

___ other_____

_____

4. Why do employees need to read and write English where you work? Check all that apply. Star the most important.

___ to follow written instructions

___ to give written instructions

___ to fill out forms

___ to understand employee benefits and pay

___ to record data or information

___ to understand data or information

___ to write reports or correspondence

___ other_____

_____

5. Which of these items would be the most valuable for employees at your company to be able to do in English?

___ Advising, Suggesting, Recommending, Insisting & Asking for Advice

___ Asking for & Giving Directions, Instructions, Information

___ Asking for & Giving Permission

___ Checking & Indicating Understanding

___ Complaining

___ Describing Situations, Events, Problems

___ Expressing Nervousness, Anxiety, & Worry

___ Informing

___ Making Excuses

___ Ordering & Taking Orders

___ Remembering, Forgetting, & Reminding

___ Showing Intention

___ Warning, Cautioning

Sample Manager Evaluation

BURR-BROWN®

Pima County Adult Education
Workplace Education Classes
Manager Evaluation

Employee Name _____

Manager Name_____FMS_____

Course Title _____Date_____

DIRECTIONS: Please indicate how much this employee has improved after taking the Skills for Success class. Circle the rating that applies for each question. If you want to elaborate on any question, please use the back of this form.

1. Did you see an improvement in the employee's math or English skills? If so, how much?

Great Moderate None Worse Not Applicable

2. Did you see an improvement in the employee's attitude, morale, or self-esteem? If so, how much?

Great Moderate None Worse Not Applicable

3. Have you seen better attendance, promptness, etc. by this employee?

Great Moderate None Worse Not Applicable

4. Have you seen an increase in productivity for this employee? If so, how much?

Great Moderate None Worse Not Applicable

DIRECTIONS: Please write your answers to these questions. If you need more space, please use the back of this sheet.

5. Has attendance in the class helped the employee on the job? If so, how?

6. Would you encourage others to attend the class?

7. Do you have any other comments pertaining to this employee and the Skills for Success class?

Sample Student Course Evaluation

PIMA COUNTY ADULT EDUCATION
WORKPLACE EDUCATION PROJECT
COURSE EVALUATION FORM

Course Title_____

Course Dates: From_____ To_____

Instructor_____

DIRECTIONS: Please circle the answer to each question.

1. Please rate the overall quality of the course.

   Excellent Very Good Good Fair Poor

2. Please rate the effectiveness of the materials used in the course.

   Excellent Very Good Good Fair Poor

3. Please rate the instructor's presentation and helpfulness.

   Excellent Very Good Good Fair Poor

4. How supportive has your supervisor been while you have been taking the class?

   Excellent Very Good Good Fair Poor

5. How supportive have your coworkers been while you have been taking the class?

   Excellent Very Good Good Fair Poor

DIRECTIONS: Write your answers to these questions.

6. Has this class helped you on the job? If so, how?

7. Would you like the course to be a different length or time?

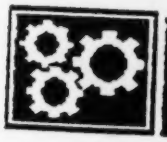
8. What can we do to make the course more useful to you in your job or home life?

9. Is there anything you would like to add about the course, materials, or instructor?

10. Has the course changed how you feel about yourself, your education, or your job?

11. Was your participation in this class voluntary? yes__ no__

Articles about the Workplace Education Project



EXEMPLARY PROJECTS

All projects funded under the National Workplace Literacy Program are required to demonstrate good prior planning and show promise for a high quality program. Some, however, exceed minimum requirements and sometimes even their own expectations. Five such projects were selected to be highlighted in this report.

WORKPLACE EDUCATION PROJECT OF PIMA COUNTY ADULT EDUCATION (PCAE)

Tucson, Arizona

Partners: Arizona Consortium for Education and Training
Southern Arizona Innkeepers' Association

Project Background

The Workplace Education Project of Pima County Adult Education (PCAE) responds to the basic skills needs of a number of employers in southern Arizona, including hotels and resorts, health care providers, and electronics, aerospace and other manufacturers. The project offers instruction to 230 students, in literacy and basic skills, English as a second language, GED test preparation, problem solving/critical thinking skills, and communication. It has selected two "umbrella" organizations whose members employ non-native speakers of English and workers with inadequate basic skills. This provides the opportunity and flexibility to train employees at a number of locations. For example, the project conducts workplace education classes for housekeeping and groundskeeping workers at resorts and hotels, production workers at manufacturing companies, and custodial workers at the University of Arizona.

Key Elements

- Prior to instruction, the Workplace Education Project conducts a job task analysis that identifies the literacy requirements of actual jobs, so skills taught will be directly related to workplace needs.

- Workers are involved in all aspects of program development and implementation.
- Advisory committees are formed at each worksite with representatives from the participating workers, management, and the instructors.
- The program is presented as a positive opportunity for employees.
- Class participation is voluntary.
- In most cases, at least 50 percent of the time employees spend in class is paid release time.
- An assessment tool (pre-test) is developed from specific workplace needs identified in the task analysis and administered to potential students recruited for the class.
- Materials from the worksite are incorporated into the curriculum.
- The curriculum also includes problems and situations that simulate actual situations in which workers use basic skills on the job.
- Ongoing interviews with employees ensure that what is being taught continues to be relevant and is meeting their needs.
- Post-tests are developed to assess student progress and the results are compared with the results of the pre-test.
- Support services such as child care and transportation are provided whenever needed.
- Educational counseling is provided to every student, including confidential discussion of personal educational goals, information about other adult education opportunities, and career options.

Indicators of Success

- Improved communications skills by participating employees, including oral and written skills.
- Improved reading, math and problem-solving skills.
- Improved morale and self-esteem.
- Better attendance and promptness by some employees.
- Increased productivity by some employees.
- Requests for more classes by both management and workers.
- Community-wide recognition, including many employer requests for PCAE's Workplace Education Project classes.

Contact:

Linda Hellman
Workplace Education Coordinator
Workplace Education Project of Pima County Adult Education
5331 W. Plata, Suite 600
Tucson, AZ 85705
Telephone 602/884-8628 (Fax: 602/623-9308)

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CHAPTER VI:

A PARTNERSHIP IN LEARNING

You've read how some companies, large and small, are tackling their work force literacy problems. Now let's take a look at how those who are delivering the services view their role.

WORKPLACE EDUCATION PROJECT: Providing Skills for Life

The Workplace Education Project (Tucson, AZ) got off the ground in 1988 after receiving a $72,000 grant from the National Workplace Literacy Program (NWLP). It was one of 37 projects in the country to receive funding from the newly developed program, which is administered by the U.S. Department of Education. The money has allowed this Arizona program to work with several partners to develop training programs for businesses around the Tucson area. The $72,000 is the initial round of funding, and since that time the Project has been funded twice by NWLP.

The Workplace Education Project, part of the Pima County Adult Education program, brings together business partners who need help training employees. The business partners, who pay matching funds, include the Arizona Consortium for Education and Training, a group of manufacturing companies, hospitals and educational institutions, the Southern Arizona Innkeepers Association, a consortium of hotels and resort corporations, and the Tucson Metropolitan Chamber of Commerce, the latest partner. "This partner is our vehicle into the small-business community, so we can meet their needs," says Project Coordinator Linda Hellman.

"We work with them to develop training programs. We perform task analyses and find out what their workers need in skills training," she says. All classes for WEP's various partners are held on site. In most cases, employees are given release time to attend the courses, which are scheduled to accommodate working hours. Subjects vary, depending on the individual company's needs, but Hellman says the goal is to link learning to the job. "We try to be job related as much as possible and to become part of the workplace setting."

While providing job-linked learning is the primary goal, "we also try to make classes relevant to employees' lives outside of work." She points to problem-solving skills or working with numbers as examples of skills that transfer from the classroom to employees' jobs and to their lives. "We like to do things in class that will help workers beyond the job—such as improving their writing skills or furthering their general education. If employees tell us their company might have layoffs, we'll go into résumé writing if that's what workers want. We are very responsive to their needs."

Some classes teach the basics to get employees up to a level where they can go on to learn the skills required for their jobs or for job advancement. "We are currently teaching a reading and writing course for one company that draws from different departments, but we apply the lessons to their job situations. We get them into the writing activities they need, such as writing incident reports, memos, claim and adjustment letters, or performance appraisals. We put them into a context that has immediate value."

Class structure is nontraditional. "It's a very flexible program," she says. "We can work with individuals at their own levels. But people also work in groups, depending on their rate of learning." Employees take part in what Hellman calls cooperative learning activities. "We have them work in groups to enhance their team-building skills, which companies really want these days."

Hellman works very closely with each company to establish goals, and then fine-tunes or makes changes as classes move along. "This is a participatory program. We try to have workers involved in all aspects of the program. Advisory committees help us achieve this goal. We get a lot of input from the workers initially, but we've found that our first interviews don't always reveal all their needs," says Hellman. "Sometimes we're five weeks into a class before employees reveal additional problems they may have been reluctant to tell us about at the start. For instance, after a few weeks in a class we were running for a college's custodial workers, one problem came up. They had trouble getting college students out of the rest rooms so that they could clean up. That's not something you would necessarily discover in a task analysis. So we built scenarios to teach them how to deal with this situation." Such a problem-specific approach is a big benefit to workers.

Hellman stresses that classes are not just for entry-level or hourly workers. "We have supervisors and managers attend some classes with their employees." She says this is a positive development, since companies that are shifting to Total Quality Management want all employees to upgrade their skills. "We don't advertise our classes as remedial or basic," she adds. "This is an opportunity for everyone."

24 ERB (Employee Relations Bulletin, July 21, 1992, Report No..1764, Section III, Bureau of Business Practice.)

ADULT EDUCATION

TESOL NEWSLETTER AE-IS

The Official Publication of the Interest Section
Teachers of English to Speakers of Other Languages

February 1992 ISSUE THEME: WORKPLACE LITERACY vol. XIX no. 1

TUCSON PROGRAM

Linda Hellman
Coordinator, Workplace Education Project
Pima County Adult Education Tucson, Arizona

Pima County Adult Education (PCAE) in Tucson, Arizona, began its Workplace Education Project in November, 1988, through funding from the U.S. Department of Education's National Workplace Literacy Partnership Grants. Since that time, PCAE's Workplace Education Project has trained workers at 14 worksites in ESOL, basic skills (reading, writing, math), GED preparation, and communication skills. These customized worksite classes have been provided at a variety of locations, including electronic and manufacturing companies, hotels, a nursing home, a hospital, a government agency, and the University of Arizona's Physical Resources Department.

Implementing programs at a number of worksites in a variety of industries is quite a challenge. With three years' experience behind us now, we have learned a lot about the unique characteristics of workplace education. A great deal of up-front time is needed to market the program to management, conduct a task analysis, design a program, recruit learners, and write curriculum and assessment. Workers are involved in many aspects of the program, including planning, development, recruitment, instruction, and peer support.

The Workplace Education Project focuses on meeting the needs of both the workers and the employer. We begin with what is called a task analysis. Workers and their supervisors are interviewed and observed on the job. All written and read job-related materials are collected. The task analysis is then used to determine what skills are needed for workers to do their jobs well.

In ESOL, as with most workplace education classes, the curriculum is customized to meet the specific needs of each individual worksite. We use a functionally-based approach that is organized by job tasks and includes problems and situations that simulate actual occurrences workers may experience on the job. Materials used at the workplace are also incorporated into the classroom instruction.

One of the most outstanding ESOL classes that the Workplace Education Project is presently providing is at Burr-Brown, a local electronics company. The learners decided to devote much of their attention to enhancing their reading and writing skills. Understanding specifications, describing work situations, understanding and describing benefits, and writing requests for ups are some examples of the work-related functions that are ght in the classroom.

Advisory committees are formed at each workplace to ensure that the classes are meeting the needs of the workers and the employer. Representatives from the classes, instructors, and the employer discuss the direction the classes are going and suggestions for improvement. Also, workers that attend classes are interviewed on an on-going basis so that the curriculum remains relevant, flexible, worker-centered, and participatory.

Instructors need extra time to met regularly with the advisory committee. They also have to stay abreast of the changing needs of the workplace. For example, at Burr-Brown, our instructors participated in the Manufacturing Orientation Training offered by the company to new employees which included: Introduction to Statistical Process Control (SPC), Introduction to Burr-Brown's Documentation, Environmental Control Requirements, and Electrostatic Damage (ESD).

Pre-tests are developed for assessment/screening that relate specifically to what will be taught in the class. Post-tests are administered at the end of each cycle to document improvement by comparing the results to the pre-test. All test results are confidential. In most cases, classes are offered twice a week, two hours each class session, within a cycle of approximately 10 to 15 weeks.

Workplace classes demand a great awareness of the company environment and a flexible approach. We have experienced times when an overriding need for productivity necessitated a temporary suspension of classes. At one location where we used the guest dining room for a classroom, there were many times that the class had to move to another room.

Enrollment in PCAE's Workplace Education Project is always voluntary. Many employers pay half release time for workers to attend class. At some worksites, full release time is given by the employer, while at a few, no release time is given. We have found that some release time from work to attend class makes the program more successful.

The goals of the program are to improve employee work-related skills and increase their opportunities for continued employment, career advancement, and further education and training. Since worker-centered learning deals with the needs of the whole person, the Workplace Education Project also strives to enrich workers' capabilities as individuals in society. Increased employee morale and self-esteem, fulfillment of personal goals, and a better quality of life for participants are other by-products of workplace education training.

While workplace education differs from the way ESOL instruction is delivered in other environments, the rewards are not so very different at all. Watching a class get involved and excited about learning brings the same kind of satisfaction. The instructor of the ESOL class at Burr-Brown, who has taught in many different types of ESOL classes, recently said, "This class is so great. It's the reason I went into teaching ESOL."

Photo by Tom Tai Mitchell

Workers like UA custodian Luz Ruiz sometimes cannot understand what they are being asked to do on the job. The University of Arizona and other Tucson employers have begun offering on-site English classes to improve worker performance.

Paychecks And Report Cards

From Hotels To Defense Contractors, Businesses Are Learning That If They Want Smarter Workers, They Will Have To Manufacture Them.

BY SUSAN KNIGHT

AN ENTIRE WING of a Tucson high school had to be evacuated when a custodian inadvertently created poisonous gas by mixing bleach and ammonia. He couldn't understand a warning label.

At Canyon Ranch Spa, some housekeepers don't speak enough English to understand when guests need fresh rolls of toilet paper.

A Tucson truck driver can't calculate the number of products and pallets loaded and unloaded from his rig because his addition and multiplication skills are so poor.

The Burr Brown Corporation wanted employees to become more involved with quality control. But workers first had to brush up on math skills so they could compute percentages and ratios.

A writing class was offered to supervisors at Tucson Medical Center who had trouble spelling and writing memos and employee performance evaluations clearly.

And at Hughes Aircraft Company, where workers have been asked to be more self-directed and to take a greater role in managing the work place, many employees have had to upgrade their math, communication and reasoning skills.

Tucson employers, like their counterparts across the country, are finding that workers at all levels need more education—from learning English and basic skills to learning how to analyze problems, scan documents, calculate formulas and make decisions.

Dave Kolano, vice president for the Greater Tucson Economic Council, says, "There's a real dichotomy here. At the same time jobs are calling for more literate workers, we are also seeing a declining educational base. A lot more of the work force are minorities, non-English speakers and people with minimal basic skills." Add to that the increasing number of women in the work force and you have a collection of those who traditionally have been less educated.

In time-honored fashion, some business leaders and educators heap the blame for the declining educational base on a well-trodden scapegoat—weak public schools turning out people ill-prepared to work. Others suggest a many-tentacled culprit—too much college-prep, not enough vocational education, too much television, not enough morals.

REGARDLESS OF WHERE fault might lie, many workers just aren't up to the greater expectations that pervade the modern work place.

Most jobs today require at least high school competencies, says Greg Hart, director of Pima County Adult Education. "Employers are ratcheting up their requirements for even entry-level employment," Hart says. "People who used to be able to flip burgers with less than a high school education are now required to have a high school diploma."

Trish Angulo, a research analyst with the Greater Tucson Economic Council, says, "It's no longer how fast you can put a widget together. It's: ...Can you operate a computer to inventory the widgets? The skills needed on the job require a lot more thinking, a lot more communication."

Pima County Adult Education conducted a skills assessment at one manufacturing company recently and found that of the hourly employees in assembly, maintenance, trades and other non-white-collar areas, 25 percent were reading below a ninth-grade level. Likewise, 40 percent performed below the ninth-grade level in math.

One in every five adults has reading and math skills below an eighth-grade level, while most entry-level jobs require at least 11th-grade competencies.

The rates for this company, not named because the assessment was confidential, are probably better than most companies' because each job applicant must have a high school diploma and pass intense screening, says Linda Heilman, workplace education coordinator for Pima County Adult Education.

Heilman has been working with more than a dozen employers in Tucson to establish "workplace education" programs, classes at work sites teaching basic English to advanced algebra. The county program recently received a $278,555 federal grant, which employers will match with $59,280 worth of in-kind contributions. But Heilman says the efforts hardly begin to meet the need, which extends far beyond the 250 employees in hotels, manufacturing firms and other businesses who will benefit from the program.

Tucson is not unlike the rest of the nation. A flurry of reports has painted a gloomy economic future for the country unless business, industry and education agencies do more to upgrade workers' skills. The reports—from the U.S. Office for Technology Assessment, the U.S. Bureau of Labor Statistics, the National Center on Education and the Economy and others—point to a shrinking labor force of poorly prepared, poorly educated workers at a time when American businesses are expecting more than ever of employees.

Consider:

- During the rest of this century, the nation's labor force will grow more slowly than at any time since the 1930s, says the U.S. Office of Technology Assessment.
- Eighty-five percent of the workers who will make up the work force in the year 2000 already are employed, according to the U.S. Department of Education's *America 2000* report.
- One in every five adults has reading and math skills below an eighth-grade level, while most entry-level jobs require at least 11th-grade competencies.

If the national estimate of one in five holds for Pima County, then more than 40,000 workers here need basic education or upgraded skills. Tucson has another significant group of workers with education needs: those who don't speak English.

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THE BURDEN of education may be shifting from the public schools to businesses and factories, but only a few employers here offer classes on the job—the University of Arizona, the Sheraton El Conquistador resort, Tucson Medical Center, IOResearch, Burr Brown, Goatzmos, Hughes Aircraft and a handful of others. Heilman says other employers have inquired in recent months about establishing programs, including Kino Hospital, Carondelet Health Services and Westward Look Resort.

But small businesses, which employ more than half the workers in the U.S., are saying they have few options for getting workers the education they need because of their limited resources. And small businesses may be facing the biggest burden in undereducated workers. The U.S. Small Business Administration reports that 23 percent of the employees in small businesses (those with fewer than 25 workers) are high school dropouts. That compares to 18 percent of the employees at companies with 500 or more employees.

Most workers in need of education are literate. About 40 percent of the work force has a high school education and reports of illiteracy in the work place have been largely overstated, Heilman says.

"There aren't a lot of people in the work force who cannot read, who are truly illiterate. But there are an awful lot of people who don't have sufficient skills, who need upgrading of skills," Heilman says.

Make that an *awful* lot, says Mary Hamman, director of the Pima Community College Skills Center. Workers today might read and write, but their skills are substandard.

"Employers in the private sector are often appalled at the skill levels of America's work force," Hamman says. "Tucson is no different than the rest of the country. Employers want employees to read and write and to speak English, and they find increasingly that our work force does not. I have 25 years in employment training in Tucson. Throughout the years there has been a definite decline in workers' basic skills."

Those who supervise workers—even those who supervise supervisors—in Tucson hotels, restaurants, schools and hospitals tell stories of workers who can't read "Please turn out the lights" signs, who can't figure overtime pay on their time cards or who can't spell well enough to leave simple directions for the next shift.

"We have people who are truly illiterate and people who are functionally illiterate," says Jane Wilson, training director for Canyon Ranch Spa. "We have people in supervisory positions who are functionally illiterate. They can read and write but not at the level they need to do the job adequately.

"We also have a problem with English. In housekeeping we have 80 people and probably half of them either don't know English or have minimal English skills."

In Tucson's high-tech manufacturing companies, employers say their problem is not so much a basic skills gap, but

In time-honored fashion, some business leaders and educators heap the blame for the declining educational base on a well-trodden scapegoat—weak public schools turning out people ill-prepared to work.

employees who need *upgraded* skills. Their employees, mostly high school graduates, need more education before they can carry out tasks like plotting points on a graph to monitor defective product rates.

Several years ago, Burr Brown started a "statistical process control" program, forcing a team effort to monitor quality. "We found a lot of our people couldn't figure percentages, couldn't read the manuals," says Miguel Enriquez, director of training and education at Burr Brown.

Increased technology and a renewed push to compete in the world market are creating demands for workers who are not only educated but who are able to keep on learning. At Hughes, Daisy Jenkins, manager of personnel development, says education and retraining for the work force are essential. Industry is in a "fierce competitive mode," the Japanese are setting the pace for enabling workers to determine quality and productivity, and the skills needed five years ago are outmoded today because of changing technology, she says.

Workers tell their own stories of deficient skills, of pretending to understand directions given in English, of

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"It's the math that gets me," says TMC painter John Lopez, who struggles with things like multiplying and dividing the number of paint cans in a parking lot.

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struggling to read safety guidelines for radiation exposure, of counting again and again in hopes of hitting the correct number.

One custodial worker, who asked to be identified only as Louise, says in broken English and a thick Italian accent, "When the boss tell me something, I say, 'Yes.' Even when the question do not call for, 'Yes,' I say, 'Yes.'"

Luz Ruiz, a UA custodian, says she has had trouble understanding directions. Through an interpreter she says, "A professor might ask me to come back to clean later and I'd be standing there not knowing what they're saying. They might ask me to clean the top shelf of a bookcase and leave the bottom shelf alone. And I wouldn't know what they were talking about."

Ruiz says her understanding of English has improved since she began studying English at work.

Jose Luis Montano says he often made mistakes in his 13 years of shoe repair at El Con Mall, because he could not read the orders. A divorce left him with time on his hands and he now attends night school at the El Rio Learning Center.

At Tucson Medical Center, John Lopez says, "It's the math that gets me. I work in the paint shop. When we go out to paint lines in a parking lot, one of the older guys can measure the lot, multiply and divide in his head. It makes me feel pretty silly that this guy can do that in his head and I can't. I realize I need to get more education so that I can move on."

The UA runs English-as-a-second-language classes for a couple dozen maintenance workers and Tucson Medical Center just wrapped up GED class for about 28 employees. Both employers pay workers for a portion of their time in class. The employees are expected to contribute hours of personal time to match.

The success of workforce education comes in being at the work site, making class part of the work day and teaching material in the context of the job. "If you teach people information that they're going to use immediately, their retention of that information is much, much greater than if you're teaching them math they'll never use," Heilman says.

Candace Tucker, an education coordinator for TMC, says offering schooling at work is essential. "People are tired after 40 hours of work a week at hard labor. The people we're talking about are often in the lower-paying jobs. A lot of them have a second job. They may car pool or take the bus to get to work. They have families. Time is at a premium. It's virtually impossible for them to do all of

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"The problems with the language are when you have to tell your supervisor something is going on the building and you don't have technical words..." says Tony Monica, who studied civil engineering in Panama and now works for the UA moving crew.

Tucson Medical Center offers classes for employees like housekeeping supervisor Angie Pedraza, who manages to squeeze some study time into her 10-hour work days.

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this and then go somewhere to study English. If the education is not offered at the work site, they won't get it," she says.

Angie Pedraza took time off from supervising housekeepers at TMC one day recently to work on adding and subtracting decimals in GED class.

"No way I could do this if it wasn't at work. I work 10-hour days four days a week, and the rest of the time I have a family," she says. A typical day for Pedraza means getting up at 7:30 a.m. to take her 5-year-old son to school. Back at home, she cleans house, washes clothes and gets dinner ready for her family. At 2:30 p.m. she picks up her son, takes him home to feed him, then drops him at the babysitter's as she heads to work by 2 p.m. She works until 10:30 p.m., goes home to make the family's lunch for the next day and straighten the house a bit, sleeps about six hours, then starts her day again.

An employer's expenses for workplace education can add up. The writing class for TMC supervisors cost $4,303, or about $391 per supervisor, covering teacher time, materials and release time for employees. Heilman says Pima County Adult Education charges employers $26.65 an hour—$1,466 for a 10-week session—for English and basic skills classes. But that charge doesn't cover the county programs costs, such as clerical help, the coordinator's salary or other administrative expenses.

Even if it were free, though, some employers would never be interested in workforce education.

"You will always have employers who are not interested in enhancing the skills of their workers because then they'd have to pay them more. They apparently don't have a problem with high turnover and low productivity. They can still get by," says one employment specialist.

Hamman, of the skills center, says that while she served on a state task force on literacy in 1986, she heard an agriculture leader say, "If we made all of those people literate, then we'd lose all of our workers and who would work our fields?"

BUSINESSES LOSE thousands of employee hours as supervisors must explain how to dispose of infectious waste, what a new parking policy means, how to choose health benefits and other job issues that workers otherwise could read about.

Walt Volz, director of plant services for TMC, says, "I had one employee in the shop and after five or six years I was still doing his timecard. Having employees miss a couple hours of work every week to go to school is worth it when you consider that in the long run, they'll be able to save supervisors time by reporting problems or incidents that they can't do now."

Bill Savary, UA director of custodial services, says education deficiencies are a problem for both workers and employers. "Sometimes a supervisor doesn't recognize the conscientiousness and interest of employees because of a language barrier or skills problem. When a supervisor can't communicate effectively with a worker, they don't expect as much from that worker, they can't expect as much because they can't communicate what it is they expect. They just expect less, they get less and the employee gets less."

Meliton "Tony" Mojica says his skills deficiencies have been a source of great frustration—from not being able to suggest more efficient ways to do a job to not being able to explain that he missed work because his son was ill. Mojica was a project evaluator at an international aid

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in Panama, studying to be a civil engineer. Now he works on the UA moving crew because his poor English skills bar him from other jobs.

"The problems with the language are when you have to tell your supervisor something is wrong in the building and you don't have technical words or if there's something you don't like about the job," Mojica says. "I can talk (about) a lot of things but I (am not) fluent."

Given Tucson's expanding immigrant groups and the significant Hispanic population, Heilman says, "There probably isn't a company in Tucson that doesn't need some English-as-a-second-language training."

Hotels and resorts have been greatly affected by the increasing number of workers who don't speak English, says Hal Gutt, executive director of the Southern Arizona Innkeepers Association.

Yogi Hutsen, general manager of the Sheraton El Conquistador resort, estimates that nearly a third of his workers speak Spanish as their primary language.

"We have a lot of Hispanic staff and a lot of great people," Hutsen says. "You have to not to hire great people because they don't speak English. We hire people with tremendous attitude and then train them on the job."

Unlike most hotels, El Conquistador offers classes at work. Most hotel and restaurant owners say they can't afford the expense of classes for so few employees.

Because of tight finances, the Tucson Unified School District also cannot offer employees education to rectify skill deficiencies. A principal or another supervisor can merely encourage an employee to go to night school with promises of pay incentives.

"Just because we're educators doesn't mean we have the means to educate or train our own people who don't meet basic literacy levels," says Mary Ann Lemon, assistant director of personnel.

In some businesses, though, employees' education needs go beyond basic skills and English. Many firms, particularly the high-tech electronics businesses, hire only high school graduates. Employees can read, write and compute, but they need improvement.

"At Hughes, the company is undergoing great cultural change," says Daisy Jenkins, Hughes' personnel development manager. "We are moving toward participative management and employee empowerment. All of those things point to a work force that has fewer supervisors and that makes more autonomous decisions, a work force that needs more than basic skills. Employees need communication skills, problem-solving skills, analytical skills, listening skills.

"The ability to learn is critical for today's workers," Jenkins says. "Education and retraining of the work force are going to be absolutely essential in the future. It's easier to train and retrain people who have the requisite basic skills than to educate and retrain those who don't."

Enriquez, at Burr Brown, agrees. "For a company to be competitive, it must emphasize education. Learning the skills for tomorrow's technology is not enough. You have to be able to *keep* learning."

Enriquez and about two dozen business leaders and educators have formed the Arizona Consortium for Education and Training to bring together businesses with similar educational problems and find a common solution. One solution the consortium is pursuing is "video college," making education available to people in their homes via cable television.

"It's too darn expensive for each of us to redo the wheel. Why should each business have a GED program?" he says. "People may be on welfare but they still have their CNN, their cable."

AS TECHNOLOGY AND global competition increase, and with them the demand for more basic skills, employers will have to accept more responsibility for education. "The private sector is going to have to spend a lot more money on training and retraining," Kolzow says.

Hamman says, "It's a shared problem and it should have a shared solution. It's an education problem, it's a private sector problem, it's a social problem and it's a child care problem. It's *our* problem.

"For years employers have spent a tremendous amount of money for training the cream, the higher echelon. If businesses want to make a profit, they're going to have to divert resources to teaching literacy and English skills," she says.

Because of Pima County's employment picture, the impact of diminished education levels in the shrinking labor pool may not seriously affect Tucson for some years still.

Kolzow says Tucson's employment picture is something of an anomaly because people move here for the lifestyle. As a result, Tucson has "a tremendous rate of underemployment, with many people working in jobs for which they are extremely overeducated." He cited 12,000 applications submitted for 1,200 jobs when Sears opened its telemarketing center here last year.

Similarly, American Airlines and American Express received huge numbers of applications for their information processing centers, and one company reported Tucsonans scored higher on its entrance exam than applicants from any other part of the nation.

Rob DeMarco, administrative assistant to the program manager at the state Department of Economic Security, says that many people who come here for the sunshine have attained high levels of education and are taking entry-level jobs just to live in the Southwest, leaving fewer skilled job applicants farther behind.

TUSD's Lemon says, "We have a large pool to choose from in Tucson. We can post a custodial vacancy for a week and have 200 applicants. A lot of people out there are looking for work. But within that pool we are seeing more people with a language other than English as their primary language. For bilingual teacher aide positions, we see more and more people who are not truly bilingual but who are really Spanish speakers."

Hart, of Pima County Adult Education, says, "The crunch *is* going to come. If you look at the demographics, you see there are going to be fewer and fewer people entering the work force. When these major employers and economists get together with demographers, they see that we're already in a crunch in terms of having sufficiently prepared people to take the jobs of the 1990s and the next century."

Kolzow says, "The time is definitely coming when they won't be able to find literate or skilled people in the work force. Nationally, we aren't getting the number of new entrants into the work force. It may take longer for the problem to get here because labor is not as scarce here as it is in other places around the country."

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January 11, 1993

Final Evaluation Report

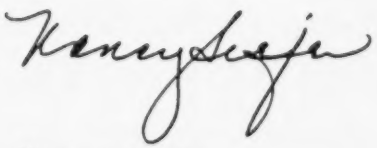
I worked with the Pima County Adult Education Workplace Education Project during its funding period from March 1, 1991 - November 30, 1992. Since the decision was made to incorporate site visit observations into project activities on an ongoing basis, the project director's quarterly and final report(s) include recommendations I made on those site visits. The project director, Linda Hellman, and I met on a regular basis throughout the project's duration to ensure the timely integration of the formative evaluation results.

I met with Linda and her staff five times during the grant period: June, 1991; December, 1991; February, 1992; June, 1992; and October, 1992. In each of these meetings, Linda arranged an itinerary for me that included observations of classes, meetings with key company personnel, advisory boards, and students, and tours of specific companies. Four of the visits also included interviews with project staff and participation in staff meetings. After each site visit, Linda and I reviewed my observations and she made any appropriate changes that were required. Notes from each of these meetings are on file in my office. In December, 1992, I reviewed Linda's final report and she included my suggestions within her final copy.

From its inception, the Workplace Education Project energetically reached out to Pima County business and industry to provide comprehensive, customized workplace literacy education programs. Customers included small as well as large companies needing a variety of literacy services ranging from English as a second language classes to communication/writing classes to algebra and pre-SPC courses. The current project contracted to provide services to 230 employees and by project's end had served over 320 workers. Thirty-seven percent of the workers were limited English proficient speakers.

In addition to providing outstanding literacy services, this project has created innovative curriculum and, most importantly, has documented its development and procedures so that other workplace programs can build on its efforts. The curriculum includes generic as well as job-specific materials. A major contribution is the development of assessment instruments. These assessments include pre- and post-assessments in each literacy area and student and manager needs assessments. The project has incorporated writing sample assessments within its communication/writing modules and developed holistic scoring guidelines to evaluate student writing. Upon completion of recommended changes by project staff and evaluator, these materials will be available to other workplace literacy programs.

The success of the Workplace Education Project is due to its outstanding director and the talented staff she has recruited and trained. Staff members have remained with the project because they enjoy meeting the challenges of the workplace and they are provided with the resources and environment to operate as a team. In addition to maintaining its literacy services and refining its outstanding curriculum and assessment instruments/procedures, the project is investigating ways to enhance manager feedback and to document the reasons why workers do not finish the courses (non-completers). The Pima County Adult Education Workplace Education Project represents a outstanding investment of tax dollars, and I enjoy and appreciate the opportunity to interact with their staff and clients.



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